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7 December 1956
Volume 124, Number 3232

SCIENCE

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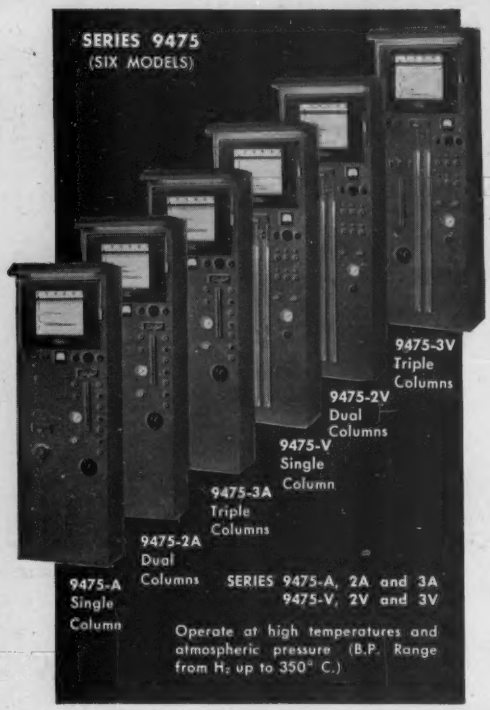

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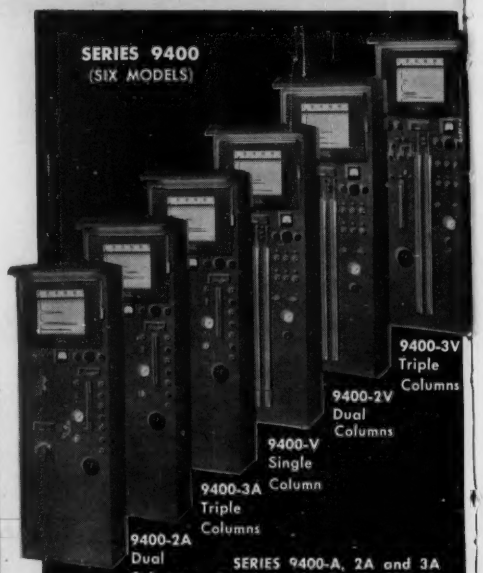

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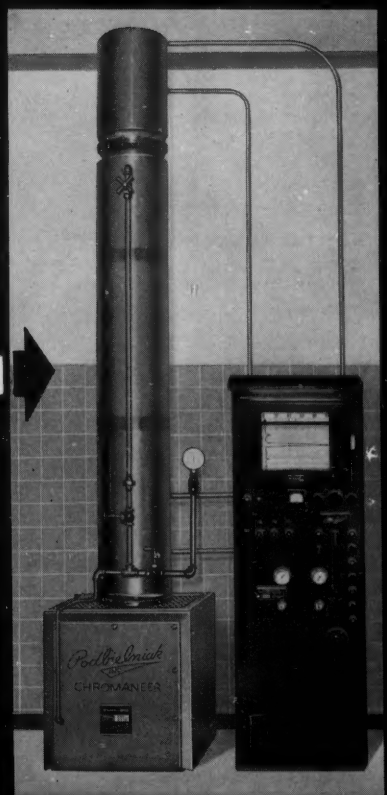

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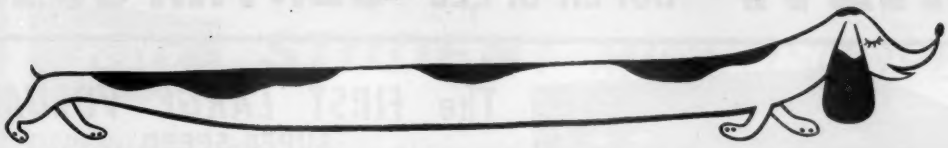

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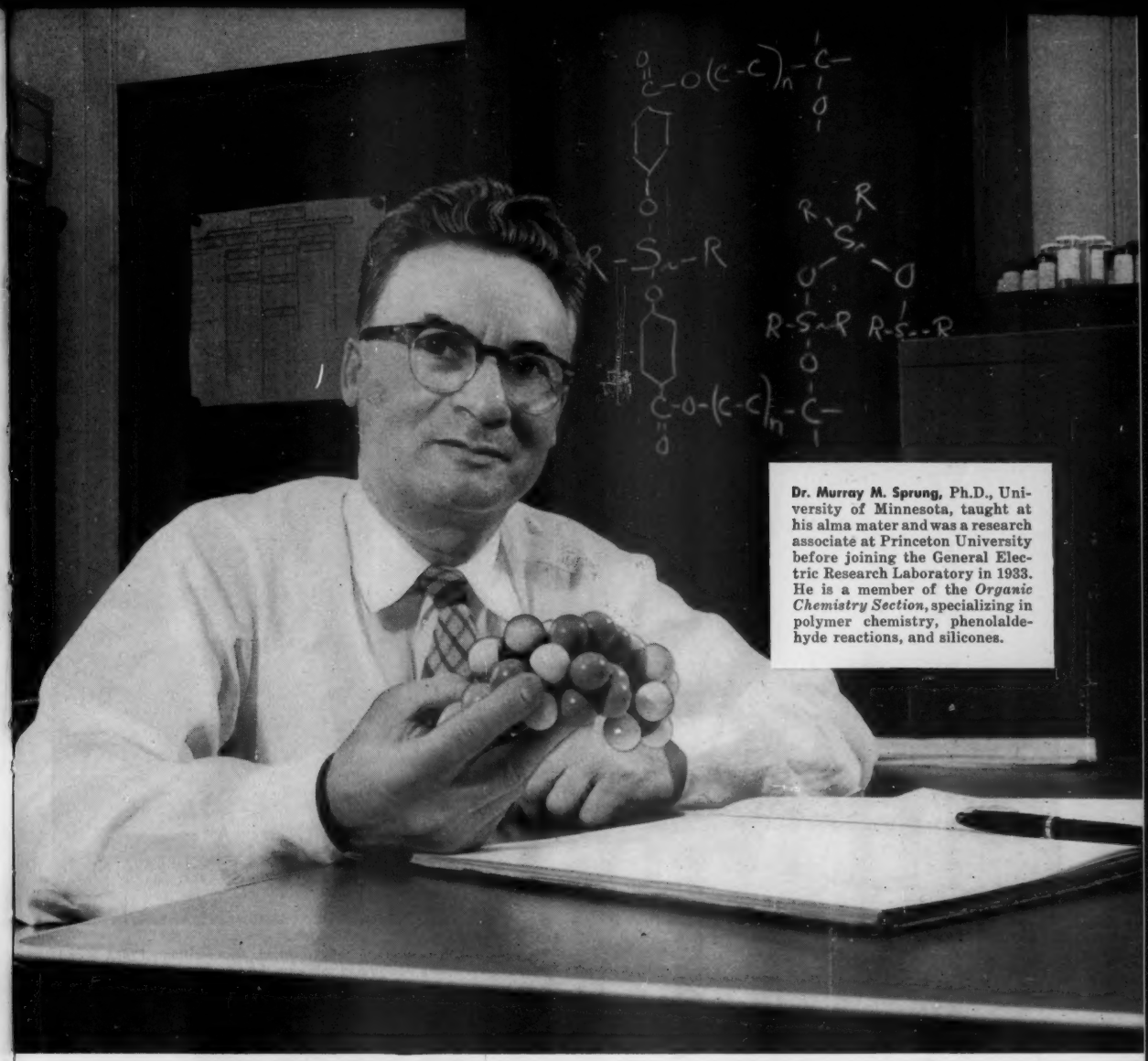

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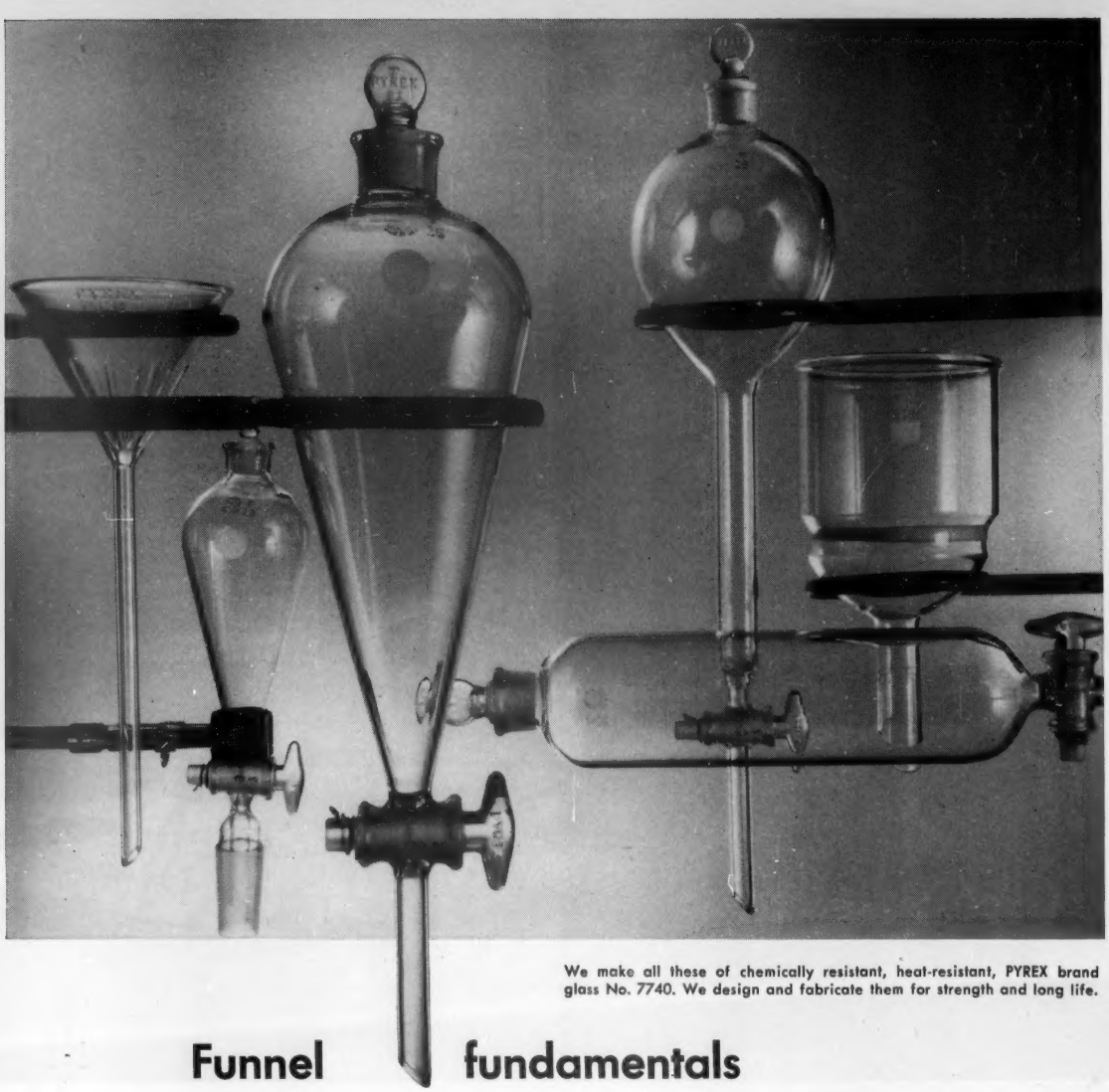

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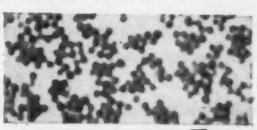
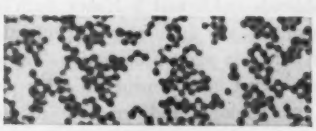
when sensitivity  testing reveals infection due to resistant staphylococci 

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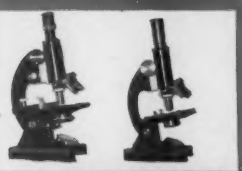

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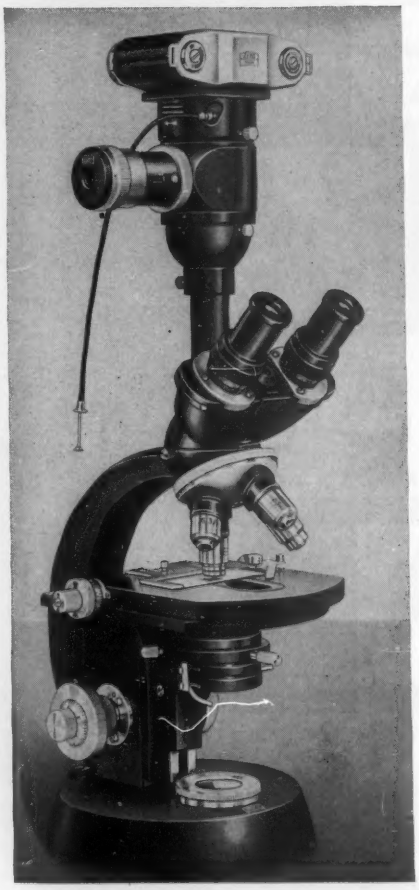

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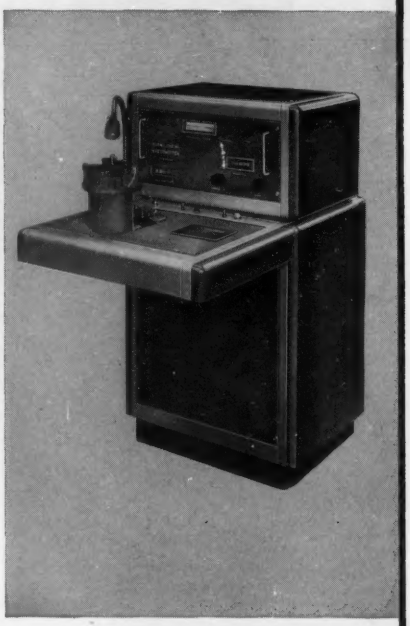

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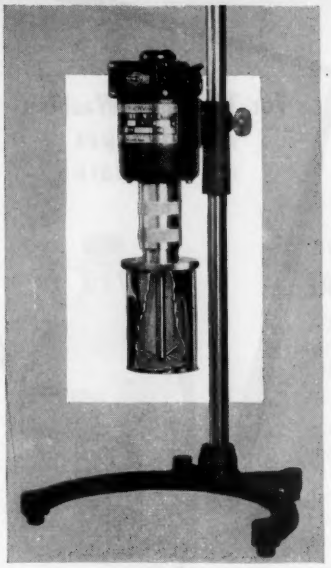

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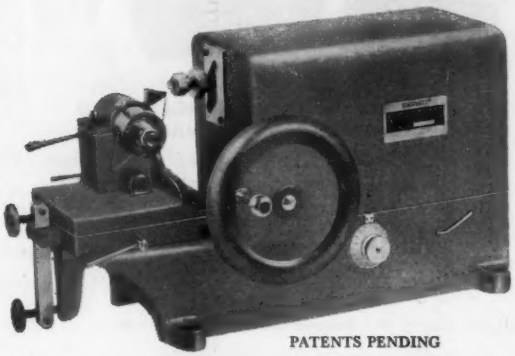

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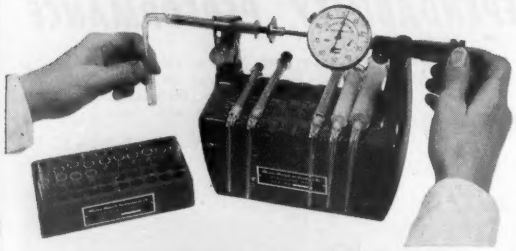

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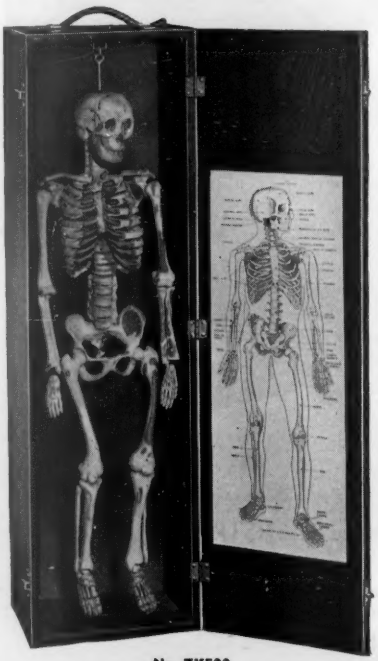

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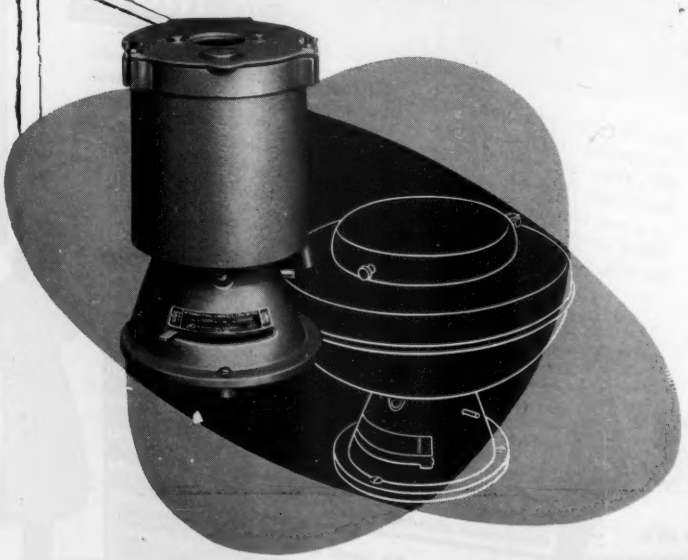

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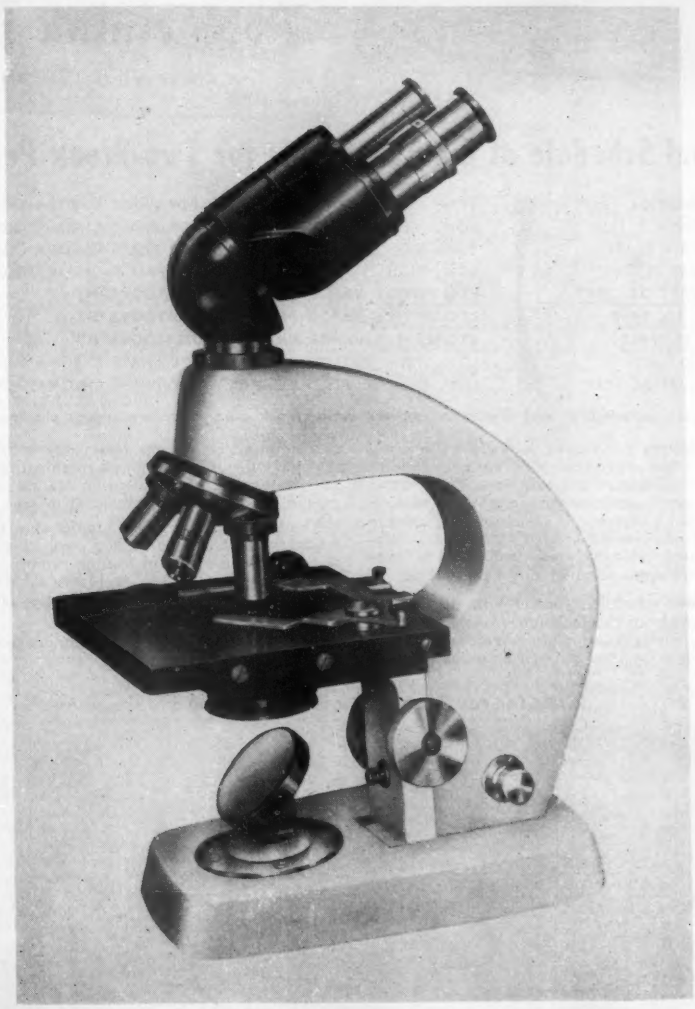

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Higher Education

The recent first interim report of the President's Committee on Education beyond the High School reminds us once again that the colleges, universities, and training institutions in the U.S. will soon have to face the problem of how to cope with the vastly increased numbers of people who will be seeking further education or training. A series of five regional conferences will be organized in 1957 to bring together groups to discuss the relations of post-high school educational policies and the national welfare, to determine what the regional problems are and what should be done in the individual states, to propose recommendations for action and for determining what the policy of the Federal Government should be in relation to education beyond the high school.

The committee estimates that the number of students in our colleges and universities will double or possibly triple by 1970 and that a quarter of a million additional college teachers will be required. This estimate is based on two factors: the prediction that, barring catastrophe, the number of high-school graduates will nearly double by 1970; and the belief that the base of American education should be broadened. Thus the report states that "the patterns already emerging in our society will necessitate that a much higher percentage of this vastly increased population receive education and training after high school" and that "larger proportions of the much larger number of young people will demand post-high school education and training. . . ."

We are not convinced, however, that the base of college education should be broadened. It seems to us that the committee implicitly proposes to extend the unselective policies of the American high school into institutions of higher learning. Of course, not every student who belongs in college now attends college, but then not every student now attending college belongs there. Before embarking on plans for headlong expansion of our institutions of higher learning, we might well consider the following questions: Who should be highly educated? Is higher education a privilege or a right? Should institutions of higher education attempt to take all comers regardless of qualification?

The interim report of the President's Committee on Education makes the flat statement that "This country will never tolerate the nurturing of an intellectual elite." It is obvious enough that this country tolerates the nurturing of the elites of stage and screen and sport. Why not of the intellect? But this is more a question of quality than a question of status. The population bulge offers the colleges and universities a chance to be more highly selective than ever before, a chance to turn away from their doors the dull, the indolent, and the indifferent, to make higher education a privilege for those qualified for intellectual accomplishments rather than a right for nearly all who are capable of finishing high school.

If the colleges and universities should seize these opportunities to improve the quality of their student bodies, the level of education attained in all could approach that now attained only in the best and the best could improve beyond their present level. We might even, in Woodrow Wilson's metaphor, see a reversal of the tendency of the sideshows to steal the interest that properly belongs to the main tent in the American educational circus.—G. DUS.

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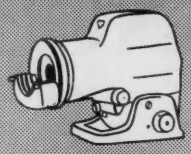
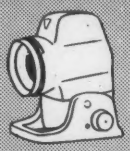


Model PR-27

Model PG-26



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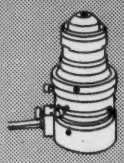


Panfocal Illuminator

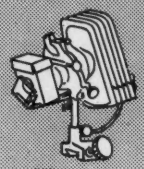
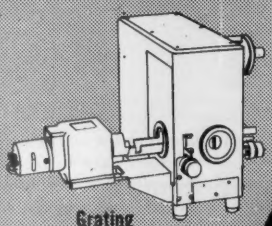


Photo-Micro Illuminator



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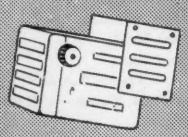

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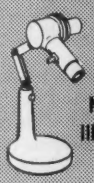
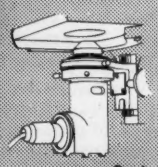
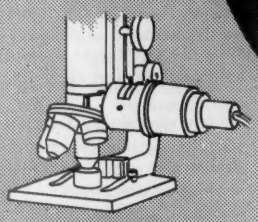


Nicholas Illuminator



Dark Field Illuminator



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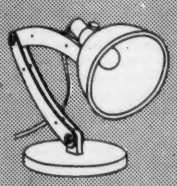

Reflector Illuminator

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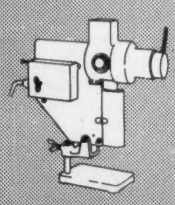

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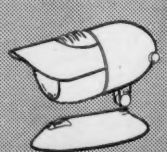

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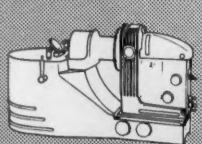

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7 December 1956, Volume 124, Number 3232 SCIENCE

Scientific Research in the Soviet Union

R. E. Marshak

The "new look" in the Soviet Union since the death of Stalin has probably had a greater impact on science than on any other field of human endeavor. It appears that there has been a tremendous improvement in the scientific climate in the U.S.S.R. and that, to a considerable extent, freedom of science has been reestablished there. I should like to make it clear that when I refer to Soviet science, I am thinking chiefly of physics, the field in which I work and in which I made most of my observations during my recent visit to the Soviet Union.

Scientific Freedom

The significant changes that have taken place since Stalin's death, particularly as they bear on scientific research, are as follows.

1) It seems that all scientists who were formerly in disgrace or under arrest have been rehabilitated and that all the brilliant scientists who had been in trouble have been returned to positions of leadership. An excellent example is the case of Kapitza, an outstanding physicist, who was placed under house arrest for 7 years when he refused to work on atomic weapons research. Kapitza was released soon after Stalin's death and is now back as director of the Institute of Physical Problems in Moscow at the same high salary (30,000 rubles per month) as the president of the U.S.S.R. Academy of Sciences, the most powerful scientific body in the Soviet Union.

2) All the usual scientific channels of communication are now open, including the exchange of scientific and technical information with foreign scientists.

3) Personal contact with foreign scientists is now allowed. Soviet scientists are permitted to attend international conferences outside their own country, and foreign scientists are invited to attend scientific gatherings in the Soviet Union and to visit Soviet laboratories.

4) The rigid mobilization of Soviet scientists to work on war projects has apparently been discontinued. For example, Soviet physicists are no longer required to work on radar, rockets, or nuclear weapons; they are permitted to concentrate their energies in such a pure nonmilitary field as high-energy nuclear research.

5) A much more liberal policy of declassification of scientific research has been adopted. The results of basic research in such fields as nuclear physics can now be freely published in scientific journals. Indeed, in some fields such as controlled thermonuclear fusion, Soviet policy has been more liberal than United States policy. On the other hand, in such a field as that of electronic computers, Soviet security regulations are still much stricter than ours.

6) Soviet science is much less nationalistic now than it was in the Stalin era. It is no longer claimed that all the important scientific discoveries are of Russian origin (which they are not,) and it is no longer necessary for Soviet scientists to publish their papers exclusively in Soviet journals and to use the Russian language.

7) There has been a considerable devaluation of Marx's philosophy insofar as pure science is concerned. For example, in biology, Lysenko is no longer political czar of Soviet genetics. In the more abstract science of physics, no lip service of any sort seems to be paid now to dialectical materialism and its alleged indispensable role in the development of physical science. In our discussions of physics at the Moscow conference, we Americans and our Soviet colleagues spoke the same language.

8) Freedom of criticism in science is accepted as a virtue. There was vigorous and uninhibited discussion at the Moscow physics conference, and young Soviet physicists did not hesitate to call to task distinguished academicians if points of difference arose.

Lack of Political Freedom

I can go on in this fashion, but I believe that it is evident that many of the ingredients of scientific freedom now exist in the Soviet Union, certainly as far as physics is concerned. The reemergence of scientific freedom is not to be confused with political freedom in which there has been some slight improvement in the U.S.S.R. but in which there is still a very long way to go. After all, the government of the Soviet Union is still in essence a dictatorship, a collective dictatorship if you will, but still a dictatorship. The Supreme Soviet only meets 4 or 5 days at a time, twice a year, just as it did in pre-Stalin days, and it is no more a true legislature than it was before. There is still only one party in the Soviet Union, there is no freedom of assembly, censorship continues, Lenin has replaced Stalin as the great authority on all matters of public policy, and so forth. However, the naked terror of the Stalin regime with its mass arrests, its complete isolation, its vindictiveness and single-minded suppression, and its great suspicion of and hostility to the West *appears* to have ended. Because of the failure thus far to achieve a genuine democratization of Soviet society with its concomitant built-in guarantees of permanence, the situation is an unstable one, and one cannot be certain that a new Stalin will not arise. However, it is clear that the Khrushchev smile is not solely for foreign consumption; there are observable changes associated with it as far as the general populace is concerned and, in

The author is Harris professor of physics and chairman of the department at the University of Rochester. This article is based on a talk given before the Research Committee of the National Association of Manufacturers, which met in New York on 19 Oct. 1956. The author attended the Moscow Conference on High Energy Particles held 14–22 May 1956 as a member of the American delegation.

many ways, there are remarkable changes resulting from this smile in the scientific domain.

The rebirth of scientific freedom in the Soviet Union is not tied in with any commensurate increase in political freedom and may have only a temporary basis, but the fact is that it now exists. It is now possible for a Soviet scientist to choose the subject matter of his own research and to draw the conclusions to which his investigations lead without subjecting them to the requirements of some nonscientific authority. However indispensable as are these moral and spiritual factors in the development of a healthy science, scientific research will not prosper in the present day and age without powerful material support.

Financial Support

The U.S.S.R. is sparing no effort to provide the necessary financial support for scientific research. This effort consists of providing both financial and prestige incentives to qualified students in science and engineering and also of providing funds for a very large technical and educational plant. The stipend of a Soviet graduate student exceeds the salary of an unskilled worker, and the salary of a distinguished scientist in the Soviet Union is as much as 50 times the salary of an unskilled worker. Prestige incentives are equally as great. One of the great honors for a scientist in the Soviet Union is to be elected to the Academy of Sciences, a body which plays a dominant role in the direction and support of scientific research. The honor of belonging to the U.S.S.R. Academy of Sciences is coupled with a financial remuneration equal to 10 times the salary of an unskilled workman. As a result of this policy, scientists form an élite whose scale of living—although not outstanding by American standards—stands in extreme contrast to the still low living standards of the general populace. It is therefore not surprising that of the 16,000 students at Moscow State University, 2000 are majoring in physics.

In addition to providing major financial and prestige incentives to scientists and engineers, the Soviet Union has developed an educational and technical training system with excellent facilities and high standards. Indeed, in some areas, the standards are higher than they are in the United States. For example, the average Soviet electrical engineer takes more mathematics and basic physics in his curriculum than his American counterpart and as a result appears to be more independent, creative, and critical than the average American electrical engineer. As a special twist in the whole situation, these highly talented engineers receive higher salaries and enjoy more prestige in laboratories where basic research is done than they do in an industrial set-up. During my visit to the Soviet Union, I was greatly impressed with the close collaboration that exists between physicists and engineers in research laboratories. In my own field of high-energy nuclear physics, many of the papers on fundamental accelerator design, topics which in the United States are still the exclusive concern of physicists, were delivered at the Moscow conference by engineers.

The close attention which the Soviet government is paying to the support of scientific research is manifest not only in the attractive salaries paid to its scientists and engineers and in its insistence on high standards in higher education, but is also demonstrated by the lavish provision which it makes for new up-to-date laboratories and the most modern experimental equipment. It seems that scientific research in the Soviet Union is being pursued with an urgency which is reminiscent of a wartime operation. As my colleagues and I toured the nuclear research laboratories in the U.S.S.R. last May, we noted the same personal dedication to the task at hand, the same emphasis on speed rather than cost, the same unlimited financial support for facilities and equipment which we ourselves had known at Los Alamos during World War II. It seems clear that the scientific research program in the Soviet Union is gathering enormous momentum and that the objective is to overtake American science in its great diversity, its high quality, and its magnificent sweep.

The fruits of scientific research in the Soviet Union have been the rapid industrialization of the country and the development of a modern technology which, in many ways, is second only to that of the United States. However, a strange dichotomy exists in the U.S.S.R. Although there has been remarkable progress in industrialization and technology, the developments have had relatively little impact on the general standard of living. Indeed, it appears that to a very great extent the astonishing speed of industrialization and technologic innovation has been made possible by withholding its benefits from the people at large. It seems that the lot of the common man in the Soviet Union will not be greatly improved until heavy industry and advanced technology have achieved a level comparable to that in the U.S.

From what I have said, it follows that scientific research in the Soviet Union has a potential for great achievements. Not only have the moral and spiritual conditions for independent and creative research been greatly improved since Stalin's death, but the material support is as great as it was before, if not greater. These factors, with their resulting high morale among the scientists, plus the excellence of scientific training, plus the education of the public on the value of science, will unquestionably lead to an efflorescence of Soviet science and to strong competition with the United States.

Meeting the Challenge

I believe that this challenge can be met in our own American pragmatic way without adopting the centralized control of scientific research which is part and parcel of the Soviet system. Scientific freedom already exists in the United States and indeed has existed for a long time. There is an occasional lapse such as Secretary of Commerce Weeks' dismissal of the director of the National Bureau of Standards in connection with the battery additive incident or former Secretary of Health, Education and Welfare Hobby's withdrawal of Government funds from medical researchers in whose files some derogatory information was found. But, by and large, the American scientist has been free for a long time to choose the subject of his own research and to publish his results without approval by a nonscientific authority. As far as material support of science is concerned, there has also been much improvement during the past decade.

But the whole point of my remarks is that the Soviet scientific challenge underlines the importance of a frank reappraisal of the scientific picture in our country, a reappraisal that in any case is long overdue. I believe that all responsible Americans will draw the necessary conclusions from the new situation in the Soviet Union. However, I should like to list several of my own conclusions to indicate how the quality and productivity of scientific research can be improved in the United States.

It seems to me that the financial and prestige incentives in this country are not such as to persuade the scientist or engineer to remain at the university where most of the basic research is done and where all the training of new scientists and engineers takes place. I believe that American industry might do well to ponder the possibility of subsidizing greatly increased salaries of a sizable number of outstanding scientists and engineers who remain at their university posts and continue their teaching and basic research programs. As far as our educational standards are concerned, the quality of scientific training in our graduate schools is of high quality, but the same cannot be said of the quality of training of our engineers or of scientific training in our high schools and colleges.

Improvements along these lines can be achieved if sufficient funds are made available by all levels of government and industry to train better teachers and to keep these teachers in the high schools and the colleges, to re-examine scientific and engineering curriculums, to educate the American public on the value of science and engineering, to provide financial support for *all* young people who desire to embark on scientific and engineering careers, and in many other ways. It is also essential for American government and industry to provide the increasingly large sums of money which are required to carry on basic research in the sciences in this, the middle of the 20th century. Finally, it seems to me too that American industry must re-examine the use to which it is putting its scientific manpower: Are engineers being utilized to the full extent of their intellectual resources, or are they being placed in inferior and less productive positions? Can basic research programs that are now being started up in industrial laboratories be undertaken more profitably by throwing the equivalent financial support to high-quality university laboratories where at the same time the scientists are reproducing their own kind—that is, developing new scientific manpower?

I am convinced that all these and many other things can be done without losing the essential ingredients of the scientific freedom which now obtain in the United States and without impairing the research that must be carried on in our government and industrial laboratories. I should like to conclude by stating my firm belief that American scientific research still holds a substantial lead and will continue to do so if the American government, industry, and the universities work harmoniously together in strengthening those areas in which we have developed weaknesses, in throwing our full resources into the support of basic research, and in treating the American scientist as a responsible and dedicated person. The minimum that I foresee is that American science will help to preserve the peace and that Soviet scientific achievements, impressive as they may ultimately become, will simply make their just contribution to the welfare of the human race.

AAAS Meeting, New York

Raymond L. Taylor

In the months following the preliminary announcement of the New York meeting, which will be held 26–30 Dec. inclusive [*Science* **123**, 947 (25 May 1956)], the symposia listed there have been implemented and augmented and the sections and participating societies, in a number of instances, have had to open additional sessions for contributed papers. From such program details as the names and addresses of authors, and from the volume of advance registrations and applications for housing accommodations, it is quite apparent that this year's 123rd AAAS meeting will have an excellent attendance representing all sections of the continent and abroad.

Apparently because Wednesday, 26 December, is not a holiday but Monday, 31 December, is, most sections and participating societies have started their programs on the first day, 26 December.

As the outline of symposia shows, virtually no principal field of science will be neglected. The special Moving Frontiers of Science program, "Fundamental concepts and units of science," has already been announced [*Science* **124**, 945 (9 Nov. 1956)]. Other programs that have appeared in *Science* in recent weeks are AAAS special sessions and conferences, 16 Nov.; mathematics, physical sciences, and earth sciences, 23 Nov.; biological sciences, engineering, social sciences, and philosophy, 30 Nov. The programs in psychology, agriculture, industrial science, and science in general will appear in the issue of 14 Dec.

A conspectus of symposia, panels, groups of invited papers on a particular subject, and the like, follows. (Single sessions unless otherwise noted.)

Symposia

AAAS general symposium: Fundamental concepts and units of science (two sessions).

Mathematics: The application of digital computers.

Physics: Optical absorption in solids; Optics and oriented nuclei; Diffusion in solids (two sessions); Crystal growth (two sessions).

Chemistry: Chemical and biological aspects of cellular competition; Biosynthesis of isoprenoid compounds; Organic reaction mechanisms.

Astronomy: The recent close approach of Mars; The benefits of astronomy to young people.

Geology and Geography: Recent advances in geochronometry (three sessions); Carbonate sedimentation; Ground water (two sessions); Appalachian stratigraphy and structure (two sessions); Geographical research in progress (two sessions).

Biological sciences: Modern ideas on spontaneous generation (two sessions); Museum techniques (two sessions); Biochemistry of the cell nucleus; Some unsolved problems in biology; Problems of aging (two sessions); Recruitment and training of biological scientists; Values in human ecology; The social significance of ecological research (two sessions); Biotic communities in the past and today.

Entomological sciences: Communication in insects (two sessions); Teaching entomology; The nematode situation; Responsibilities of the extension entomologist; Insect attractants; Museums and their problems; The role of insects in nature; The fate of insecticides in plants and animals.

Botanical sciences: Genetics of the fungi.

Anthropology: American archeology; Commemorating the 100th anniversary of the discovery of Neanderthal man; Man in the tropics: the Caribbean (two sessions); Anthropological theory; Transitional communities in India, Pakistan, and Burma; Current studies in cultural evolution: Oceania.

Psychology: Experimental approaches to research with children; Avoidance conditioning and anxiety; Motivational and rewarding effects of direct stimulation of the brain; Sensory processes; Advances in experimental psychopathology.

Social and economic sciences: The impact of natural science on social science; Labor mobility and earnings; Statistics in public health; Resource devel-

opment and population growth; Science versus crime (two sessions); Community planning.

History and philosophy of science: Science and ethics (two sessions); The general significance of the work of Freud; The interaction of science and technology; Measurement (five sessions); Studies in modern science; Studies in medieval science; History of medicine; Systems under stress.

Engineering: Aids for environmental control (three sessions).

Medical sciences: Epidemiology of mental disorder (four sessions); Evolution of nervous control from primitive organisms to man (four sessions); Significant trends in clinical enzymology; Antienzymes; The hospital and the sequence of care; Problems in premedical education.

Dentistry: Contributions of science to everyday practice; The human dentition in forensic medicine (two sessions).

Pharmacy: Cosmetics; Compressed tablet coatings.

Agriculture: Grassland reports—research and practice (six sessions); Ecology of grasslands; Grassland climatology; Range management; Grasslands in our national life (four sessions).

Education: Current approaches to the education of the gifted; Problems and issues in future education planning for the gifted; Cultivating the gifted underachiever; Testing for the professions; Scientists and education; Proposals for meeting the science teaching manpower crisis; Recent research in science education; Methods and techniques in high-school biological science; Methods and techniques in elementary science; How industry helps teachers bring recent advances in the physical sciences into the classroom; Making nature study and science fun; Nature in camping; New approaches to conservation; Urban conservation.

Science in general: Academy conference (three sessions); Conference on scientific editorial problems (six sessions); Conference on scientific manpower; Changing patterns of information organization; Natural history of the New York region.

AAAS Business Sessions

The board of directors of the association will meet after breakfast in a private suite in the Hotel Statler, at 9:30 A.M., Thursday, 27 Dec. Dates and hours of subsequent sessions of the board of directors during the meeting will be decided at this first session.

The council of the association will meet Thursday afternoon, 27 Dec. at 4 P.M. in the Keystone Room, Hotel Statler. A second session of the council is scheduled for Sunday morning, 30 Dec., at 9 A.M. in the same room. All members of the council have been notified individually, and it is hoped that all can attend. Subjects to be considered by the council (in addition to the agenda prepared) usually are first brought before the board of directors through the executive officer. During the meeting, communications for the board of directors should be submitted in writing and left at the Hotel Statler mail desk, addressed Dael Wolfle.

All section chairmen and section secretaries will meet Saturday, 29 Dec., for luncheon and a business session in the Gramercy Room of the Hotel Governor Clinton. Dael Wolfle and Raymond L. Taylor will be cochairmen.

AAAS Science Theatre Programs

The AAAS Science Theatre, a permanent feature of the association's annual meeting, presents showing of the latest domestic and foreign scientific films—all with sound—throughout the meeting period. In the following schedule, programs are both repeated and transposed to increase the opportunities for those attending the sessions of the 123rd meeting to see particular films. All titles will be shown twice and some a third time. The association is greatly indebted to all those who made these pictures and lent them for showing.

The AAAS Science Theatre will be in a room on the mezzanine of the Hotel Statler, near the Annual Exposition of Science and Industry.

Admission to the Science Theatre. The Science Theatre is a feature for the pleasure and information of all registrants at the annual meeting and it is deemed well worth the considerable cost of projection. Because of limitations of space, it cannot be for the casual passerby, and thus admission is restricted to those who wear the AAAS convention badge.

Hours of the Science Theatre are 9 A.M. to 1 P.M. and 2 P.M. to 6 P.M. on the 4 days 26–29 Dec., inclusive, and 9 A.M. to 1 P.M. 30 Dec.

26 Dec., Morning

The Waiting Harvest. U.S. Steel Corporation. Color, 23 min.

The Secrets of the Heart. Produced by MPO Productions for the American Heart Association, and local Heart Chapters, with Irvine H. Page as guide. Black and white, 29 min.

Station 307. Produced by Jean Cousteau for the British Petroleum Co. Ltd.; distributed by J. E. Anderson, New York, purchasing agent for British Petroleum Trading, Ltd. Black and white, 20 min.

American Engineer. Presented by the Chevrolet Motor Division, General Motors Corporation; distributed by Jam Handy Organization. Color, 29 min.

Handling of Laboratory Animals. Produced by MacQueen Film Organization, Great Britain; distributed by the National Society for Medical Research. Black and white, 18 min.

A Report on Smog. Produced by Stanford Research Institute; distributed by Modern Talking Picture Service, Inc. Color, 28 min.

This Is Color. Produced by the Interchemical Corporation; distributed by Modern Talking Picture Service, Inc. Color, 27 min.

To Serve the Mind. Produced by the National Film Board of Canada; distributed by Text-Film Department, McGraw-Hill Book Company. Black and white, 25 min.

Continental Glaciers. Produced by the department of photography for the department of geology, Ohio State University, with the assistance of Richard Goldthwait; distributed by the Motion Picture Division, Ohio State University. Color, 13 min.

26 Dec., Afternoon

Iron Ore from Cerro-Bolivar. U.S. Steel Corporation. Color, 31 min.

The Petrified River: the Story of Uranium. Produced by Union Carbide and Carbon Corporation in cooperation with the Bureau of Mines, Department of Interior, with the technical assistance of the U.S. Atomic Energy Commission. Color, 28 min.

Dynamics of the Tubercle: in vivo Observations of Pathogenesis and Effects of Chemotherapy in the Clark Rabbit Ear Chamber. Produced by Robert H. Ebert and William R. Barclay, department of medicine, University of Chicago, with technical assistance by Churchill-Wexler Film Productions, Inc.; supported by a grant from Pfizer Laboratories. Color, 28 min.

The Rival World. Shell Oil Company. Color, 27 min.

Atomic Achievement. British Information Services. Color, 20 min.

Unconditional Surrender. National Foundation for Infantile Paralysis. Black and white, 24 min.

Better Seeds for Better Grasslands. U.S. Department of Agriculture. Color, 31 min.

The Colour of Life. National Film Board of Canada. Color, 24 min.

27 Dec., Morning

Down a Long Way. Produced by Halas & Batchelor Cartoon Films Ltd., London; distributed by J. E. Anderson, New York, purchasing agent for British Petroleum Trading, Ltd. Color, 18 min.

Still Going Places. Written and directed by George C. Stoney, in collabora-

tion with Frederic D. Zeman and Leo Dobrin, Home for Aged and Infirm Hebrews of New York; produced by Potomac Film Production; supported by a grant from Pfizer Laboratories. Black and white, 40 min.

The Sodium Reactor Experiment Fabrication. Produced by Atomics International, Division of North American Aviation, Inc., for the U.S. Atomic Energy Commission. Color, 18 min.

Meiosis. Produced by Commonwealth Scientific and Industrial Research Organization, Australia; distributed by International Film Bureau, Inc. Color, 12 min.

The Golden Leaf. Produced by the American Tobacco Company, Inc. Color, 24 min.

Anger at Work. Produced by International Film Bureau and Oklahoma State Department of Health. Black and white, 21 min.

Atmospheric Pressure. Produced by Encyclopaedia Britannica Films, Inc. Black and white, 11 min.

The Great Adventure. Produced by Arne Sucksdorff, Sweden; distributed by Louis de Rochemont Associates. Black and white, 75 min.

27 Dec., Afternoon

Epidemiology and Clinical Aspects of Coccidioidomycosis. Produced by the U.S. Public Health Service and Veterans Administration. Color, 20 min.

Dynamic Measurement. Produced by Consolidated Engineering Corporation; distributed by Modern Talking Picture Service, Inc. Color, 27 min.

The Forest Tent Caterpillar. Produced by National Film Board of Canada. Color, 18 min.

First a Physician. Produced by E. I. duPont de Nemours & Company, with the cooperation of the American College of Radiology. Color, 27 min.

The Search: M.I.T. (Automation). Produced by Young America Films, Inc. Black and white, 27 min.

Stress and the Adaptation Syndrome. Produced by Research & Scientific Films, Inc., and Campus Film Productions, Inc., with collaboration of Hans Selye, University of Montreal; written by Norman P. Schenker, Research & Scientific Films, Inc., and Leo L. Leveridge, Pfizer Laboratories; sponsored by Pfizer Laboratories. Color, 35 min.

Man Against a Fungus. Produced by National Film Board of Canada. Color, 35 min.

The Search: Criminology Research. Produced by Young America Films, Inc., with the collaboration of the Graduate School of Criminology, University of California. Black and white, 25 min.

28 Dec., Morning

Same as 27 Dec., afternoon.

28 Dec., Afternoon

Same as 27 Dec., morning.

29 Dec., Morning

Same as 26 Dec., afternoon.

29 Dec., Afternoon

Same as 26 Dec., morning.

30 Dec., Morning

The Rival World. Shell Oil Company. Color, 27 min.

This Is Color. Produced by the Interchemical Corporation; distributed by Modern Talking Picture Service, Inc. Color, 27 min.

The Secrets of the Heart. Produced by MPO Productions for the American Heart Association, and local Heart Chapters, with Irvine H. Page as guide. Black and white, 29 min.

The Search: Criminology Research. Produced by Young America Films, Inc., with the collaboration of the Graduate School of Criminology, University of California. Black and white, 25 min.

The Petrified River: the Story of Uranium. Produced by Union Carbide and Carbon Corporation, in cooperation with the Bureau of Mines, Department of Interior, with the technical assistance of the U.S. Atomic Energy Commission. Color, 28 min.

Meiosis. Produced by Commonwealth Scientific and Industrial Research Organization, Australia; distributed by International Film Bureau, Inc. Color, 12 min.

The Great Adventure. Produced by Arne Sucksdorff, Sweden; distributed by Louis de Rochemont Associates. Black and white, 75 min.

Hotel Headquarters

The Hotel Statler is the official headquarters of the AAAS; it is where the council of the association will meet and where other business sessions will be held. The Press Room—for receipt of authors' abstracts and the only source of press releases—is in the Washington Room on the mezzanine floor, one flight above the lobby.

The Main Registration-Information Center, the Visible Directory of Registrants, the AAAS Office, the AAAS Science Theatre, and the Annual Exposition of Science and Industry are also on the mezzanine floor of the Statler.

The headquarters of the 18 sections and participating societies follow (the societies are grouped in the same sequence as the letters of the sections with which they are affiliated or associated).

Pennsylvania Zone Hotels

Statler. AAAS; Press; Exhibits; AAAS Sections C (Chemistry), F (Zoological Sciences), G (Botanical Sciences), M (Engineering), N (Medical Sciences), Nd (Dentistry), Np (Pharmacy), P (Industrial Science); Alpha Chi Sigma, American Association of Clinical Chemists, Gordon Research Conferences; American Society of Zoologists, International Union for the Study of Social Insects, New York Zoological Society, Society of Systematic Zoology, Society of Vertebrate Paleontology; American Society of Naturalists, Beta Beta Beta Biological Society, Ecological Society of America, Genetics Society of America, Society for the Study of Evolution, Society of General Physiologists; American Society of Plant Physiologists, Botanical Society of America, Mycological Society of America, Torrey Botanical Club; Engineering Manpower Commission; Alpha Epsilon Delta, American Academy of Forensic Sciences, American Association of Hospital Consultants, American Medical Association Committee on Cosmetics, American Physiological Society, American Psychiatric Association, American Public Health Association; American College of Dentists, American Dental Association, International Association for Dental Research; American Association of Colleges of Pharmacy, American College of Apothecaries, American Pharmaceutical Association Scientific Section, American Society of Hospital Pharmacists; American Association of Scientific Workers, American Institute of City Planners, Conference on Scientific Manpower, Honor Society of Phi Kappa Phi, National Academy of Sciences–National Research Council, National Association of Science Writers, National Science Foundation, New York Academy of Sciences, Scientific Manpower Commission, Scientific Research Society of America, Sigma Delta Epsilon, Society of the Sigma Xi, United Chapters of Phi Beta Kappa, U.S. Atomic Energy Commission.

Governor Clinton. AAAS Sections A (Mathematics) and L (History and Philosophy of Science); Association for Computing Machinery; American Philosophical Association, History of Science Society, Philosophy of Science Association, Society for the Advancement of General Systems Theory; Association of Technical Writers and Editors, American Documentation Institute, Conference on Scientific Editorial Problems, Technical Publishing Society.

Sheraton-McAlpin. AAAS Sections H (Anthropology), I (Psychology), K (Social and Economic Sciences), Q (Education); American Institute of Human Paleontology, Society for American Archaeology; American Political Science Association, American Statistical Association, Association for the Psychiatric Treatment of Offenders, Institute for Research on Crime and Delinquency, Na-

tional Academy of Economics and Political Science, Pi Gamma Mu, Society for the Advancement of Criminology; AAAS Cooperative Committee on the Teaching of Science and Mathematics, American Educational Research Association, International Council for Exceptional Children, National Association for Gifted Children, National Association for Research in Science Teaching, National Association of Biology Teachers, National Science Teachers Association; Academy Conference, American Nature Study Society.

Martinique. AAAS Sections B (Physics), E (Geology and Geography), O (Agriculture); American Meteorological Society, Sigma Pi Sigma; Association of American Geographers, Geological Society of America, National Geographic Society, National Speleological Society; American Society of Range Management; American Geophysical Union.

New Yorker. Entomological Society of America.

Uptown Hotels

Alden. AAAS Section D (Astronomy), American Astronomical Society, Astronomical League.

Excelsior.

Henry Hudson. Also recommended for the astronomers.

Registration

Main Registration-Information Center. The AAAS Main Registration-Information Center is located on the mezzanine of the Hotel Statler. It will be open daily 26–30 Dec., 8 A.M. to 8 P.M., except Wednesday evening, 26 Dec. till 9 P.M.; and Saturday evening, 29 Dec. when it will remain open till 11 P.M. to accommodate any nonregistrants who wish to attend the AAAS Smoker.

Badges and General Programs may also be obtained at the supplementary registration desks, but the Main Registration is the only place to receive supplementary literature, maps, and the like. Advance Registrants (who receive programs and badges prior to the meeting) are urged to visit the Main Registration, at any convenient time, to receive these items.

Supplementary registration desks. For the convenience of those attending the 123rd meeting, there are four supplementary registration desks as follows: Hotel Sheraton-McAlpin, 26 Dec., 8 A.M. to 9 P.M., 27–29 Dec., 8 A.M. to 8 P.M.; Hotel New Yorker, 26 Dec., 4 P.M. to 9 P.M., 27–28 Dec., 8 A.M. to 8 P.M.; Hotel Governor Clinton, 26 Dec., 8 A.M. to 9 P.M., 27–28 Dec., 8 A.M. to 8 P.M.; American Museum of Natural History, 26 Dec., 7 P.M. to 10 P.M., 27 Dec., 8:45 A.M. to 6 P.M. Guests at Hotel Martinique will find the Sheraton-McAlpin convenient for registration. Astronomers will register at the Hayden Planetarium Conference Room, 26 Dec., 7:45 to 10 P.M.; and Roosevelt Lecture Hall (fifth floor), American Museum of Natural History, 27 Dec., beginning 8:45 A.M.

Registration fee. The AAAS registration fee is $3 for all; a spouse or child not wishing a separate Program may register for $1, if at the same time. Each registrant receives a receipt, a convention badge, and the General Program-Directory—the only publication with the programs of the 18 AAAS Sections and of the 82 participating organizations. Any person who purchases an advance copy of the General Program-Directory but does not register in advance and who then attends the meeting has agreed to complete his registration—and is expected to do so—at the Main Registration Center, or at one of the four supplementary registration desks, after which he will receive his convention badge and the privileges that go with it.

AAAS convention badge. Every thoughtful person will wish to register and thus pay his share of the expenses of the meeting. The AAAS convention badge will indicate that you are a complete participant in the 123rd convention of the association. The badge should be worn throughout the meeting, because it reminds others to register, it is needed for admission to the AAAS Science Theatre, the AAAS Smoker, and the reception that follows the presidential address, and it helps your friends to find you.

Visible Directory of Registrants. The much-consulted Visible Directory of Registrants, for the maximum convenience of all, is located on the Statler mezzanine, near the Annual Exposition of Science and Industry. The hours it will be open correspond exactly with the hours the Main Registration is open—daily 8 A.M. to 8 P.M. or later (on certain evenings). The registration cards of all registrants are placed in the Visible Directory as soon as possible after registration. The arrangement is alphabetical. The cards of advance registrants are *completely* alphabetized and typed, since they will have been posted in Washington prior to the meeting; all other registration cards are filed to the second or third letter of the surname (Ba, Be, etc.). Members of the press, exhibitor personnel, and guests are included in the Visible Directory—on *blue* cards instead of yellow. Registrants will find the Visible Directory invaluable in determining the convention addresses of friends attending the meeting.

Mail, telegrams, and messages. Mail and telegrams addressed in care of the AAAS will be held at the AAAS Office in the Hotel Statler. Efforts will be made to notify addressees listed in the Visible Directory, but the association assumes no responsibility for the delivery of mail or of telegrams. Telephone and personal messages will be filed alphabetically in the AAAS Office, and the names for whom they are intended will be posted on a bulletin board.

Society meal function tickets. Tickets to the dinners or luncheons of any participating society are obtainable only from representatives of that society, either during preceding sessions of that society, or at the AAAS Information Center.

Facilities for Eating

In addition to the hotel coffee shops and dining rooms, the restaurants and public eating places in New York are so numerous and varied that it is not feasible to list them here. Those who are interested, however, and wish seriously to explore exotic cookery in this cosmopolitan city should consult the New York Classified Telephone Directory, a copy of which is in every hotel room. Under "Restaurants," there are advertisements of places that specialize in Chinese, French, Greek, Hungarian, Italian, Mexican, Polish, Russian, and Spanish dishes—and also seafood establishments.

New York Committees

It would be quite impossible to arrange a large and complex meeting and to carry it through to a conclusion, successful in all respects, if it were not for the devoted services of many local scientists and other members and friends of the association. They merit the unstinted appreciation of all who attend. It is noteworthy that Eugene Holman accepted the general chairmanship of the New York meeting without delay, appointed the local committees promptly, and has kept in close touch with all phases of this year's meeting.

General Chairman

Eugene Holman, chairman of the board, Standard Oil Company (New Jersey).

Executive Secretary

Cecil Morgan, executive assistant to the chairman, Standard Oil Company (New Jersey).

Committee on Exhibits

Albert Bradley, chairman of the board, General Motors Corporation, *chairman.*

W. O. Baker, vice president-research, Bell Telephone Laboratories.

E. W. Engstrom, senior executive vice president, Radio Corporation of America.

Frederic H. Holmes, vice president, The Texas Company.

Jasper H. Kane, vice president-research and development, Chas. Pfizer & Co., Inc.

Alexander Kartveli, vice president-research and development, Republic Aviation Corporation.

A. B. Kinzel, vice president-research, Union Carbide and Carbon Corporation.

G. A. Nesty, vice president, Allied Chemical & Dye Corporation.

E. R. Piore, director of research, International Business Machines Corporation.

E. Duer Reeves, executive vice president, Esso Research and Development Company.

C. Guy Suits, vice president and director of research, General Electric Company.

Robert C. Swain, vice president-research and process development, American Cyanamid Company.

Committee on Finance

W. J. Murray, Jr., chairman of the board, McKesson & Robbins, *chairman.*

Harold Boeschenstein, president, Owens-Corning Fiberglas Corp.

James F. Brownlee, partner, J. H. Whitney & Company.

S. Sloan Colt, chairman of the board, Bankers Trust Company.

Frederick W. Ecker, president, Metropolitan Life Insurance Company.

Horace C. Flanigan, president, Manufacturers Trust Company.

Harold Helm, chairman of the board, Chemical Corn Exchange Bank.

John J. McCloy, chairman of the board, Chase Manhattan Bank.

Committee on Physical Arrangements

Samuel Schenberg, supervisor of science, Board of Education of the City of New York, *cochairman.*

Edward G. Bernard, director, Bureau of Audio-Visual Instruction, Board of Education of the City of New York, *cochairman.*

Herman Campsen, Jr., chairman of physical science, Bronx High School of Science.

Alexander Efron, chairman of physics, Stuyvesant High School.

Harold Nagler, chairman of biology, James Madison High School.

Henry Semat, professor of physics, City College.

George S. Tulloch, professor of biology, Brooklyn College.

Committee on Public Information

Marion Harper, Jr., president, McCann-Erickson Inc., *chairman.*

Leonard H. Goldenson, president, American Broadcasting Company, Paramount Theatres, Inc.

Robert E. Kintner, executive vice president, National Broadcasting Company, Inc.

James A. Linen, publisher, *Time,* The Weekly Newsmagazine.

Daniel E. Mich, editorial director, *Look* magazine.

Malcolm Muir, president, *Newsweek* magazine.

Robert W. Sarnoff, president, National Broadcasting Company, Inc.

J. L. Van Volkenburg, president, Columbia Broadcasting System, Inc.

William L. Wheeler, Jr., secretary, Medical Society of the County of New York.

Mary L. Wolfle, assistant public relations director, Pratt Institute.

Honorary Reception Committee

John C. Adams, president, Hofstra College.

W. P. Anderton, secretary, Medical Society of the State of New York.

Reginald M. Atwater, executive secretary, American Public Health Association.

George S. Avery, Jr., director, Brooklyn Botanic Garden.

John H. Baker, president, National Audubon Society.

Joseph W. Barker, president, Research Corporation.

Henry A. Barton, director, American Institute of Physics.

Samuel Belkin, president, Yeshiva University.

Lloyd V. Berkner, president, Associated Universities, Inc.

Rome A. Betts, executive director, American Heart Association.

Howard T. Bosworth, president, National Tuberculosis Association.

Frank G. Boudreau, president, Milbank Memorial Fund.

Detlev W. Bronk, president, Rockefeller Institute for Medical Research.

Edwin S. Burdell, president, Cooper Union for the Advancement of Science and Art.

Joseph Miles Chamberlain, chairman, American Museum-Hayden Planetarium.

Richard L. Conolly, president, Long Island University.

Clarence E. Davies, secretary, American Society of Mechanical Engineers.

David M. Delo, president, Wagner College.

Edward J. Donovan, president, New York Academy of Medicine.

C. T. Durgin, president, State University of New York Maritime College.

Paul Dawson Eddy, president, Adelphi College.

Paul Fejos, president, Wenner-Gren Foundation for Anthropological Research.

John A. Flynn, C.M., president, St. John's University.

Edward G. Freehafer, director, New York Public Library.

H. Rowan Gaither, Jr., chairman of the board, Ford Foundation.

Buell G. Gallagher, president, City College.

John W. Gardner, president, Carnegie Corporation of New York.

Harry D. Gideonse, president, Brooklyn College.

H. B. Hass, president, Sugar Research Foundation, Inc.

J. A. W. Hetrick, president, New York Medical College.

Charles B. Hitchcock, director, American Geographical Society.

Francis H. Horn, president, Pratt Institute.

S. Paul Johnston, director, Institute of the Aeronautical Sciences.

C. S. Jones, president, Academy of Aeronautics.

Mervin J. Kelly, president, Bell Telephone Laboratories.

C. G. King, executive director, Nutrition Foundation, Inc.

Grayson Kirk, president, Columbia University.

Marcus D. Kogel, dean, Albert Einstein College of Medicine.

E. Paul Lange, secretary, Engineers Joint Council.

Hugh Luckey, dean, Cornell University Medical College.

William Mazer, president, Muscular Dystrophy Associations of America.

Laurence J. McGinley, S.J., president, Fordham University.

Gordon McLintock, superintendent, United States Merchant Marine Academy.

George L. McNew, director, Boyce Thompson Institute for Plant Research.

William A. Medesy, director, Long Island Agricultural and Technical Institute.

John Walden Myer, director, Museum of the City of New York.

Raymond J. Nagle, dean, New York University College of Dentistry.

Carroll V. Newsom, president, New York University.

A. E. Parr, director, American Museum of Natural History.

Augustine Philip, F.S.C., president, Manhattan College.

Thomas Clark Pollock, dean, New York University.

Willard C. Rappleye, dean, Columbia University College of Physicians and Surgeons, and president, Josiah Macy, Jr., Foundation.

William J. Robbins, director, New York Botanical Garden.

Harry Stanley Rogers, president, Polytechnic Institute of Brooklyn.

Charles F. Roos, chairman of the board, Econometric Institute.

Walter S. Root, president, New York Academy of Sciences.

James J. Rorimer, director, Metropolitan Museum of Art.

Richard L. Rosenthal, president, Richard and Hinda Rosenthal Foundation.

Mefford R. Runyon, executive vice president, American Cancer Society.

Dean Rusk, president, Rockefeller Foundation.

John M. Russell, executive director, John and Mary R. Markle Foundation.

Edgar C. Schenck, director, Brooklyn Museum.

Donal Sheehan, dean, New York University College of Medicine.

George N. Shuster, president, Hunter College.

Charles H. Silver, president, Board of Education of the City of New York.

Hans Simons, president, New School for Social Research.

Frank T. Sisco, director, Engineering Foundation.

Alfred P. Sloan, Jr., president, Alfred P. Sloan Foundation.

Harold Taylor, president, Sarah Lawrence College.

John Tee-Van, director, New York Zoological Society.

John J. Theobald, president, Queens College.

Austin J. Tobin, executive director, Port of New York Authority.

R. W. G. Vail, director, New York Historical Society.

F. J. Van Antwerpen, secretary, American Institute of Chemical Engineers.

William H. Wisely, executive secretary, American Society of Civil Engineers.

Eleanor R. Witkus, executive secretary, Torrey Botanical Club.

Arthur G. Zupko, dean, Brooklyn College of Pharmacy.

AAAS Public Information Service

Each person who will deliver an address or present a paper at the New York meeting is requested to provide the association's Public Information Service with 100 copies of a nontechnical abstract of his paper. One hundred copies of *complete* manuscripts are also required of papers presented by (i) officers of the association; (ii) officers and invited speakers who appear on the programs of the participating societies; and (iii) authors whose papers are particularly newsworthy. Most authors already have recognized the necessity of this procedure and have sent their material to the association's director of public information, Sidney S. Negus, Medical College of Virginia, Richmond. If you are an author of an address or paper and have not done this, please send to Negus, *to arrive in Richmond on or before 15 Dec.*, 100 copies of your nontechnical abstract. If it is impossible for you to send this material to Richmond to arrive by 15 Dec. (*and mails are much slower in the pre-Christmas period*), then mail all your material to Negus—or deliver it to him in person—at the AAAS Press Room, Washington Room, on the mezzanine of the Hotel Statler, before or during the convention. As an aid to the association's Public Information Service, please send copies of your abstract to your local newspapers with the time indicated when it is to be presented in New York.

The necessity for the general public to be kept informed of the results of the scientific research which it supports, directly and indirectly, is quite evident. Organized science and the individual scientist must have the understanding and support of all. It is, of course, equally important that the advances of science be publicized with accuracy and clarity without sensationalism. Progress in this direction in recent years has been most gratifying, thanks largely to members of the National Association of Science Writers, other accredited science reporters, managing editors of American newspapers, and program managers of radio and television stations.

It is in the interest of accuracy and completeness that science writers frequently wish to discuss various research results with investigators. If you are asked to cooperate in this respect or to participate in a press conference, please do so not only for your own protection but for the benefit of science in general. Scores of science writers will be covering this meeting. News stories filed by the representatives of all the wire services will be published and broadcast throughout the entire civilized world. At no other scientific meeting are the facilities for the dissemination of the most recent findings in all branches of science so complete as they are at the great, diversified meetings of the AAAS.

This year, not only is the association fortunate in the continued services of Sidney S. Negus, chairman of the department of biochemistry, Medical College of Virginia, Richmond, but also in its Local Committee on Public Information, headed by Marion Harper, Jr., president of McCann-Erickson, Inc.

Local Travel Directions

At the 123rd meeting, the numerous public rooms of the five hotels have made it possible for almost all the sessions to be held in one compact area, with no hotel more than two blocks from the Statler, and most of them within one block of the headquarters hotel. The sessions at the American Museum of Natural History are most conveniently reached by the Eighth Avenue Subway.

To American Museum of Natural History and Hayden Planetarium: From the Hotel New Yorker or from the street, enter the Eighth Avenue Subway station at 34 St. and Eighth Ave., which is one block west of Seventh Ave., or two blocks west of Broadway. Take only an *uptown local* train labeled AA-Washington Heights. The rear cars will be most convenient for direct entrance into the museum. Avoid all other trains since expresses skip the museum and others turn east into Queens at Columbus Circle. Get off at 81 Street—American Museum of Natural History (the preceding station is 72 Street). Running time is 15 minutes. The 79 St. exit leads directly into Roosevelt Hall, where either elevators or stairs may be used to reach adjacent halls; the 81 St. exit to the street is close to the planetarium. To return to the hotel zone, reverse the route taken, taking any *downtown* train. Get off at 34 Street (the preceding station is 42 Street).

Tours and Points of Interest

At this meeting, there will be no formal tours sponsored by the AAAS as a whole, but the New York Zoological Society will conduct guided tours at the Bronx Zoo, and certain participating societies have planned tours and field trips, which will be found in their programs.

Points of Special Interest

The Map and Directory of New York—available to all registrants and distributed only from the Main Registration-Information Center, on the mezzanine, Hotel Statler—displays and lists all principal points of interest on Manhattan Island. The following are of special interest.

American Geographical Society (Broadway at 156 St.). Open daily to visitors interested in geographical research and reference facilities. Hours 9 A.M. to 5 P.M. No admission charge.

American Museum of Natural History (Central Park West at 79 St.). Open week days 10 A.M. to 5 P.M.; Sunday 1 to 5 P.M. No admission charge.

Boyce Thompson Institute for Plant Research (Yonkers, New York). Open daily 8:30 A.M. to 5 P.M. No admission charge. Tours or appointments with staff arranged upon request.

Brooklyn Botanic Garden (1000 Washington Ave., Brooklyn). Open daily 9 A.M. to 5 P.M. No admission charge.

Empire State Building Observatories (34 St. and Fifth Ave.). Open daily 9:30 A.M. to midnight. Admission charge of $1.30, tax included, *reduced to 90 cents for AAAS registrants*; apply at Main Registration-Information Center for special tickets.

Hayden Planetarium (81 St. near Cen-

tral Park West). Demonstrations 26–29 Dec., inclusive at 11 A.M. and 1, 2, 3, 4, 5, and 8:30 P.M. Admission 65 cents for adults during the day, 95 cents at night; 40 cents for children at all times. (Members of the American Astronomical Society and of AAAS section D, and their wives, wearing their AAAS convention badges, will be special guests.)

Metropolitan Museum of Art (Fifth Ave. at 82 St.). Open week days 10 A.M. to 5 P.M.; Sunday 1 to 5 P.M. No admission charge.

Museum of Modern Art (11 W. 53 St.). Open week days 11 A.M. to 6 P.M.; Sunday 1 to 7 P.M. *Admission charge of 60 cents reduced to 35 cents for AAAS registrants wearing convention badge.*

Museum of the City of New York (Fifth Ave. and 103–104 Sts.). Open week days 10 A.M. to 5 P.M.; Sunday 1 to 5 P.M. No admission charge.

New York Botanical Garden (Bronx Park). Christmas exhibits in both Conservatory and Museum Building. Conservatory open daily 10 A.M. to 4:30 P.M.; *no admission charge for AAAS registrants wearing convention badge.* Museum open daily 10 A.M. to 5 P.M.; no admission charge. Open house for botanists and all who are interested, all day 26 Dec.

New York Historical Society (170 Central Park West). The society will welcome any of the attendance who may wish to visit the library and museum in search of the early history of science in America.

New York Public Library (Fifth Ave. at 42 St.). Central building open week days 9 A.M. to 10 P.M.; Sunday 1 to 10 P.M. Science division reading room open Thursday, 9 A.M. to 10 P.M., other week days 9 A.M. to 6 P.M., Sunday 1 to 6 P.M.

New York Zoological Society-Bronx Zoo (185 St. and Southern Boulevard). Special guided tours daily, 27–31 Dec., beginning at 11 A.M. for zoologists and other interested scientists.

Rockefeller Center (50 Rockefeller Plaza). Open daily 9 A.M. to 9 P.M. Guided tour, which includes the observation roof, leaves every 15 minutes. Admission charge of $1.50 *reduced to $1.20 for AAAS registrants*; apply at Main Registration-Information Center for special tickets.

St. Patrick's Cathedral (Fifth Ave. and 50–51 Sts.). Special "Science Sunday" service, 30 Dec., 10 A.M.; Sermon by Rev. Laurence J. McGinley, S.J., president, Fordham University.

Annual Exposition of Science and Industry

The AAAS Annual Exposition of Science and Industry, which dates back to 1924 (still earlier with certain pioneer exhibitors), has long been an important and integral part of the association's annual meeting. It provides an outstanding opportunity for those who use the tools and materials of science to meet those who produce and distribute these essentials. The 1956 edition of the exposition, on the mezzanine of the Hotel Statler, is up to the same high standard of previous years.

The exhibits include the latest and best in scientific books, instruments, and materials; they are on a scale, and with a diversity, not usually possible at the meeting of an individual society or group of societies in a single field of science. In addition to this "core" of the exposition, a variety of organizations have special exhibits, and there are *technical* exhibits by large firms representative of the basic industries of the nation. Prominent concerns in the chemical, pharmaceutical, and other industries are sharing with the attending scientists some of their impressive technological accomplishments. The exposition should not be missed by anyone who attends the 123rd meeting.

The exposition is open to (i) all registrants attending the meeting and (ii) adults who have applied for, and received, complimentary tickets of admission.

The hours of the exposition are as follows: Wednesday, 26 Dec., 7 to 10 P.M.; Thursday, 27 Dec., 9 A.M. to 6 P.M.; Friday, 28 Dec., 9 A.M. to 6 P.M.; Saturday, 29 Dec., 9 A.M. to 6 P.M. and 8 to 10 P.M.; Sunday, 30 Dec., 10 A.M. to 2 P.M.

AAAS New Member Service—Science—The Scientific Monthly

Booth 54. Whether or not one is a member of the American Association for the Advancement of Science, every person attending this meeting is cordially invited to visit the AAAS booth for information concerning the association and its activities. Beyond the satisfaction of strengthening its work for science, for scientists, and for society by one's membership, there are demonstrable personal advantages in joining the association.

Since its founding, in 1848, the association has admitted to membership not only professional scientists but also other men and women who have a general interest in science, who wish to keep informed of the progress of science, and who would like to support the high purposes of the one organization that represents *all* science. The New Member Service will be pleased to accommodate those who wish to join the association as of 1 January. Those already members conveniently can nominate others for membership.

Included in the annual dues of $6.50 (for 1957), each member has a choice of a year of *Science*, the professional scientist's newsweekly, or *The Scientific Monthly* (or *both* for an additional $3.50). Free sample copies of these two publications will be distributed and all not familiar with both magazines should visit this booth, where symposium volumes and AAAS membership insignia are also on display. Prospective advertisers may obtain sample copies of the magazines and rate cards.

AAAS Traveling High School Science Libraries

Booth 53. The AAAS administers this experimental traveling library program, which is financed by a grant from the National Science Foundation. The exhibit consists of the 200 books comprising the traveling libraries that are being circulated to 104 high schools throughout the United States in order to interest young people in science, to assist those interested in the choice of a scientific career, and to demonstrate to high-school and community librarians the kinds of science and mathematics books that should be added to their collections in order to satisfy the interests of young people. A list of the books is available free of charge, and an annotated catalog of the traveling libraries may be purchased for 25 cents.

Now in its second year of operation, the program already has proved that it is fulfilling its objectives, and hundreds of school community libraries are basing new acquisitions on the list of books. Summer institutes for high-school science teachers sponsored by the NSF are using the traveling libraries to provide collateral and recreational reading.

Academic Press, Inc.

Booth 24. Academic Press, Inc., publishers, will display the complete set of *Physical Techniques in Biological Research,* edited by Gerald Oster and Arthur W. Pollister. Also exhibited will be *Advances in Chemical Engineering,* volume I; Michael Heidelberger's *Immunization, Physical Methods in Chemical Analysis,* volume III, edited by W. G. Berl; *Solid State Physics,* volumes I–III, edited by F. Seitz and D. Turnbull; and *Rheology: Theory and Applications,* volume I, edited by F. R. Eirich. Sample volumes of some newly reprinted sets, produced by Johnson Reprint Corporation, will include the *Journal of Biological Chemistry, Electronics, American Mathematical Monthly,* and *Reviews of Modern Physics.*

Aero Service Corporation

Booth 74. A new look at the world is presented in the series of new plastic relief maps at Aero Service Corporation's exhibit. Colorful, lightweight, three-dimensional maps of Canada, the United States, South America, Europe and the World will be shown, along with

new relief maps of California, New Jersey, Pennsylvania and Wisconsin. Aero's portfolio of 12 U.S. Geological Survey quadrangles in plastic relief, showing representative geologic formations, will also be displayed. These new maps are lithographed in as many as 12 colors on durable Vinylite, then vacuum formed to show mountains, valleys, and drainage patterns. The map's surface is plastic-coated to protect its colors; fingerprints or dust wipe off readily, and the markable, easily cleaned surface permits the use of marking crayons. Generally, 2000 to 3000 geographic names are shown on each map. The maps are large; the United States map, for example, is 64 by 40 inches with a scale of 1 inch = 75 miles; the World map measures 61 by 42 inches, scale 1 inch = 434 miles; South America is 41 by 54 inches, scale 1 inch = 110 miles. Produced by Aero Service, a worldwide aerial mapping and exploration company, these new relief maps are stimulating teaching tools, useful in many curriculum areas.

Allied Chemical & Dye Corporation

Booths 5 and 6. National Aniline Division of Allied Chemical and Dye Corporation—the Pharmaceutical Sales Department—will present a new display that features color photomicrographs illustrating applications of some of the widely used biological stains sold by the company. The display will also call attention to the other types of products offered, which include pharmaceutical chemicals, *p*H indicators, oxidation-reduction indicators, diazo salts, and staining solutions. Another section of the Allied Chemical display will show recent developments in Baker & Adamson reagent and fine chemicals, marketed by the company's General Chemical Division.

American Tobacco Company, Inc.

Booths 39 and 40. The exhibit of the Research Laboratory of the American Tobacco Company will feature a picture display in full color of the growing and processing of tobacco from the seed to the cigarette. Representatives from the Research Laboratory will be in attendance at the exhibit, and technical literature will be available for distribution.

Association of American University Presses

Booth 27. Each university press represented in the exhibit is a separate publishing company producing technical, medical, and scholarly works as well as other books of vital interest. This joint exhibit enables you to see books from a number of the university presses and, if you so desire, to order them direct from the booth or from the publishing press. A checklist of all the books on display is available at the booth.

Becton, Dickinson and Company

Booth 11. The exhibit of Becton, Dickinson and Company will consist of laboratory instruments, syringes, needles, disposable blood-donor sets, vacutainers, and allied products.

Biological Abstracts

Booth 34. *Biological Abstracts* will feature a more complete coverage of the world's biological literature and a greatly improved abstracting and indexing service. The annual subject indexes will be up-to-date for the first time in years. At least 40,000 abstracts, more abstracts of the Russian literature, better pinpointing of abstracts of biochemical interest, and other improvements will enhance the value of this nonprofit, cooperative service to biologists in 1957. Because the biological literature is so diversified, and published in so many journals throughout the world, it would be impossible for any individual to keep posted on the significant contributions in even a single field. That is why *Biological Abstracts* is maintained by biologists themselves and generally considered an essential instrument in both teaching and research. The brief, yet informative, abstracts enable subscribers to follow all the recent developments in a minimum of time. Representatives will be in attendance to answer questions. Constructive criticism from users will be welcomed.

C. A. Brinkmann & Company, Inc.

Booths 55 and 56. This year's exhibit of the Brinkmann Company will feature some newly introduced pieces of equipment such as Ultra thermostats, Zeiss spectrophotometer, the Brinkmann Micro Cine set-up for regular and time-lapse cinematography, an ultrasonic interferometer for liquids, improved models of analytical and micro balances (Sartorius) and various types of photomicrographic apparatus, exposure meters and microscopes for transmitted and reflected light illumination. Also on display will be a Steinheil universal spectrograph for the visible, ultraviolet, and near infrared. This apparatus permits instant change-over from one type of optics to another which feature makes it a highly useful tool for spectrographic research where a truly versatile piece of equipment is needed.

Cambridge University Press

Booth 43.

Carolina Biological Supply Company

Booths 61 and 62. Carolina Biological Supply Company will have on display our latest development in stacking-type culture bowls which have been designed especially for use in the biological laboratory. In addition, we will have cultures, specimens, prepared slides, Plast-O-Mounts, and the latest laboratory equipment. We will have a staff of professional biologists in attendance to assist you with any of your technical problems. Our latest catalogue is now available to all in the teaching profession without charge. If you are not on our mailing list, be sure to notify our representative.

The Coca-Cola Company

Booths 31 and 32. Ice-cold Coca-Cola will be served through the courtesy and cooperation of the Coca-Cola Bottling Company of New York, Inc., and the Coca-Cola Company.

P. F. Collier & Son Corporation

Booth 28. The Collier exhibit will feature among other general works the new 20-volume *Collier's Encyclopedia*. This currently edited and conscientiously revised new general reference work is recommended by educators and librarians for use in junior and senior high schools and colleges. It is second to none in authoritativeness, readability, recency of coverage, or price. Additional features are a 400,000-entry comprehensive index, plus a unique 10,000-volume integrated bibliography. This new *Collier's Encyclopedia* is particularly outstanding for its articles on contemporary biography and modern science. More than 3000 pages are devoted to scientific subjects and areas. Avail yourself of a new free booklet entitled "Enriching the general science curriculum with *Collier's Encyclopedia*."

Denoyer-Geppert Company

Booth 42. Denoyer-Geppert Company will exhibit a wide variety of visual teaching appliances for the biological sciences and related subjects. Unbreakable plastic models will comprise the largest part of the display, with the D-G life-size dissectible torso and head model as the featured item. Other plastic models on human anatomy will be shown, along with several botany and zoology models and a new series for embryology. In addition to models, the complete group of charts in the Denoyer-Geppert anatomy series will be available for examination. There will also be selections from other series of large, colored wall charts, covering nearly all aspects of biology. A good representation of the collection of nearly 400 charts available through Denoyer-Geppert will be on hand. Plastic embedded specimens will be among the new items shown at the D-G booth. Besides many beautifully finished mounts of individual specimens, there are highly instructive groupings of related subjects and outstanding em-

bryological studies. Samples representing some of the other facets of the D-G line of Biocraft products will be included in the display: skeletons, skull preparations, museum mounts, laboratory manuals and test sheets. Experienced Denoyer-Geppert representatives will be in attendance to answer questions and discuss the application of the various visual aids.

Ealing Corporation

Booths 7 and 8. The Ealing Corporation is exhibiting apparatus manufactured by six different British manufacturers for whom Ealing is the exclusive distributor in the United States. Included are the following. R. & J. Beck, Ltd.; direct-reading spectrometer reading to 1 angstrom; the Hartridge reversion spectrometer for the detection and measurement of carbon saturation in hemoglobin; ultraviolet spectroscope; microspectroscope; reflecting microscope for investigation in the infrared, visible, and ultraviolet; stereoscopic microscopes, and dissecting microscopes. British Drug Houses, Ltd.: chemicals for titration in nonaqueous solvents; oxidation-reduction indicators; microanalytical reagents; spot test outfit; and concentrated volumetric solutions. H. J. Elliott, Ltd.: new Amber Line laboratory glassware; 6-inch reinforced bulb "Beeka" thermometers; stirring thermometers; differential thermometers; and low Actinic glassware. Griffin & George, Ltd.: Courtauld atomic models with elastically distortable valency angles and scaled at 0.8 inch = 1 angstrom; measuring microscope for both horizontal and vertical use covering an area of 232 square centimeters and reading to 0.01 millimeter on both scales; and a cathetometer with a usable 100-centimeter range reading to 0.01 millimeter. W. G. Pye & Co., Ltd.: self-contained "Scalamp" galvanometers; universal pH meter; miniature pH meter weighing only 4½ pounds; automatic titrator; precision vernier potentiometer; and portable potentiometer. Royal Worcester Porcelain Company, Ltd.: three-piece funnels in nine sizes that can be disassembled and thoroughly cleaned and inspected; Royal Worcester pure sintered impervious alumina ware for use at temperatures up to 2000°C and in chemical applications requiring special properties.

Educational Testing Service

Booth 50. The services of the Educational Testing Service include tests, testing programs, research and services for selection, guidance, scholarship competitions, placement, and educational evaluation. ETS develops tests for direct sale to qualified users in schools, colleges, business, governmental agencies, and professional associations; administers nationwide testing programs; builds programs tailored to special needs; conducts fundamental research in measurement; and provides professional advisory services.

Encyclopaedia Britannica, Inc.

Booth 63. This leading reference work with its 188-year history has been completely revised in an intensive effort of the last 13 years, representing an investment of $4,000,000. Illustrated in color, it contains 38,149,128 words, many of which have been either revised or rewritten. There are approximately 539,107 index references.

Ercona Corporation—Carl Zeiss Jena

Booth 14. The Ercona Corporation, American agency for the world-renowned Carl Zeiss Jena Optical Works, will exhibit and demonstrate optical instruments for scientific research and technological laboratories. Our display will feature research and laboratory microscopes with accessory equipment for phase-contrast, dark-field, and polarization microscopy and photomicrography, and stereomicroscopes, micromanipulators, refractometers, polarimeters, and interferometers. We will also exhibit the Siemens & Halske recording camera for time lapse photomicrography and cinemicrography. Our technical personnel will be on hand for consultation.

Esso Research and Engineering Company

Booths 51 and 52. The United States patent system is a keystone in the structure of American business industry. Through its incentive to research, it is a dynamic and beneficial force in our way of living. The system has helped bring into our life hosts of new and useful products, and has helped create whole new industries. The Esso Research and Engineering Company exhibit pays tribute to the U.S. patent system and features a typical example of an invention that it helped to stimulate—butyl synthetic rubber. Butyl, created from oil, occupied an important position during World War II and since then has branched out into scores of significant new applications. In photographs and displays, the exhibit documents the butyl research story, from the discovery and basic patents through its recent development as a new and unique raw material for passenger-car tires.

Gaumard Company, Inc.

Booth 36. Gaumard Company, Inc., exhibits flexible and plastic three-dimensional teaching models. Both biological and clinical models are shown. Some models follow the usual pattern of design, albeit in most advanced materials; others are unique in design and execution. For instance, the miniature plastic skeleton (27 inches) is the only model of its kind—though reduced in size, it gives all the essential data of osteology and musculature in the human being. The plastic model of the vertebral column and nervous system presents in a strikingly simple form the interrelation of the central nervous system and the autonomic system and their topographical relations to the vertebral column and spinal cord. This model has already attracted the interest of leading neurologists and teachers. The transparent phantom model, though primarily of interest to the obstetrician, is a clear example of the advanced design of Gaumard's models—this is the only model of its kind which permits the close study of the birth mechanism by a large number of students at the same time. Last, but not least, the miniature torso model brings to the younger student of biology the essentials of human anatomy in a form not done before.

General Electric Research Laboratory

Booths 59 and 60.

General Motors Corporation

Booths 45 and 46. The Centri-Filmer—a mechanical device for spinning liquid vaccines, serums, or plasma into a microscopically thin film for sterilization by ultraviolet light—was developed by General Motors research staff to aid medical science. The project, undertaken as a public service, was suggested by the staff of Chicago's Michael Reese Research Foundation, who needed a dependable apparatus to produce a thin, unbroken liquid film in which harmful bacteria could be destroyed by ultraviolet light. Today it is being used by a large pharmaceutical company for polio vaccine production. Under supervision of Michael Reese Foundation, it also has been used to purify blood plasma, ACTH for treatment of rheumatic arthritis, hoof-and-mouth disease serum for Mexican cattle, and a rabies vaccine. Medical researchers believe it will open new avenues for future vaccine development. Three other contributions to the technical enrichment of medical science offered as a public service by GM research staff are as follows: The Dodrill-GMR mechanical heart, a pump that substitutes for the human heart when a patient undergoes heart surgery (in 1952 the National Association of Science Writers listed it as one of the top ten scientific developments of that year); (ii) The electrostethograph, a sensitive pickup for detecting the heart's faint, low frequency sounds, too faint for the human ear or a physician's stethoscope, to detect; and (iii) the photoelectric oxyhemograph, which monitors the blood oxygen count of a surgery patient and gives the anesthetist

an instant reading of the patient's anesthetic condition.

Graf-Apsco Company

Booth 66. If you have any microscope troubles, it would be well to stop at Booth No. 66 of the Graf-Apsco Company, "America's leading microscope repair house." Also exhibited are new Graf-Apsco microscopes with exclusive features designed into the stand to keep the instrument in good working order indefinitely. If you do not know what to do with your obsolete microscope, the Graf-Apsco Co. will buy it for cash or accept it in trade.

William J. Hacker & Co., Inc.

Booth 9. The William J. Hacker exhibit will include the following Reichert instruments: the research microscope Zetopan, the outstanding, most advanced research instrument, with reflected and transmitted light and dual illumination, for biology, fluorescence microscopy, examination of opaque specimens, photomicrography, and cinephotomicrography; the research metallograph and universal camera microscope "Me F" (inverted type) with 4- by 5-inch built-in camera, with five alternate light sources for reflected and transmitted light and dual illumination, for metallography, biology, fluorescence microscopy, and related fields—an instrument of unlimited versatility; the stereoscopic microscope series Mak, with special cross-motion adjustment for easy examination of material; the original Kofler hot (or cooling) stage for observation of the melting process of substances under polarized light; the original Kofler hot (or cooling) bench for quick identification of organic substances by determination of their melting points within seconds; and the Micro-Viewscope, a projection microscope with built-in screen. The following instruments will be shown for the first time: the Perth-O-Meter, new surface-finish tester, with electronic tracer system which automatically indicates and records roughness of plane, convex, and concave surfaces or arbor holes within seconds; and the new portable *Profilux*, optical profile projector and comparator, for quick and accurate control of machined parts.

Harvard Apparatus Company, Inc.

Booth 33. The Harvard Apparatus Company, Inc., a nonprofit enterprise, will display apparatus of interest to both the teacher and investigator in physiology. In addition to showing our standard line of respiration pumps, stimulators, ergographs, clamps, and so forth, we shall exhibit for the first time our new interchangeable motorized transmissions designed to be interchangeable with kymographs, continuous paper recorders, and infusion pumps. These plug-in units are a complete motorized 5000-to-1 gear-shift package. The products manufactured by the Harvard Apparatus Company are not available through distributors or agents, but are sold directly from our factory to educational institutions, research laboratories, and persons engaged in research in medicine.

D. C. Heath and Company

Booth 64. The D. C. Heath and Company exhibit will feature the following: *Biology* by Relis Brown, a brand-new college textbook for the beginning biology course; *Biology* by Kroeber, Wolff, and Weaver, a new high-school biology text; *Heath Elementary Science* series by Herman and Nina Schneider, a popular series of science textbooks for the elementary schools; *Chemistry in Action*, third edition, by Rawlins and Struble, a chemistry text for secondary schools. In addition, we are showing numerous other science textbooks for use in high schools and in colleges.

International Business Machines Corporation Research Center, Poughkeepsie

Mezzanine area A.

Chas. J. Lane Corp.

Booths 3 and 4. Chas. J. Lane Corp. of New York City will display a large selection of museum cases at the 1956 AAAS Exposition of Science and Industry. Included in their exhibit will be herbarium cases for the storage of botany specimens, entomology cases for the storage of insect specimens, skin cases for the storage of bird and animal skins, and cases for the storage of geology and paleontology specimens. In addition to these cases, a line of Visi-Shelf filing equipment will also be displayed. This revolutionary record-filing equipment makes possible the holding of twice as many records in the same space, or the same amount of records in half the space that would be occupied by standard filing equipment. Records filed in the Visi-Shelf are arranged from left to right, allowing increased visibility and greater accessibility. This equipment is available in different sizes in a variety of colors. Literature can be obtained at the exhibit. For further details, write Chas. J. Lane Corp., 105 Chambers Street, New York 7, N. Y.

Library of Science

Booth 10. The Library of Science was organized in 1955 to bring to working scientists, as well as to highly informed laymen, the enduring books in science which exemplify the unity of scientific thought and inquiry. Books of all publishers are made available, including important classics and imported editions, always at substantial savings to members. Among the distinguished authors whose works have recently been distributed are George Sarton, Albert Einstein, Fred Hoyle, George Polya, Theodosius Dobzhansky, Louis De Broglie, Ralph Linton, and J. Robert Oppenheimer. One of the important current selections is the new four-volume set, edited by James R. Newman, *The World of Mathematics*. It is shown in the Library of Science's exhibit, along with other recent selections available.

Linguaphone Institute

Booth 15. Linguaphone Institute, producer of "World's Standard" conversational home-study courses in 34 languages, proudly presents its new revised material in leading languages. Available in a choice of speeds on unbreakable, fidelity discs, they are the ideal way in which to attain full reading and conversational fluency in a foreign language with a minimum expenditure of time. Advanced units are also available. Also on exhibit in the Linguaphone booth are the Dormiphonic instruments for relaxful learning developed by Linguaphone's research affiliate. The Dormiphone phonograph and the unique Dormiphone memory trainer are designed to help speed up the learning of a language or the memorization of specialized material. Free trial lessons and full demonstration of the Dormiphone phonograph and memory trainer, as well as of the Linguaphone method, are available without obligation.

Lourdes Instrument Corp.

Booths 72 and 73. Lourdes Instrument Corp. will display a variety of new designs in high-speed centrifuges, as well as their all purpose Multi-Mixer homogenizer. You are cordially invited to review another Lourdes' contribution to the world of science; the model LR superspeed refrigerated centrifuge, available with three rotors as follows: (i) 9-inch angle rotor with 400-cubic-centimeter capacity and speeds up to 16,000 revolutions per minute; (ii) 11-inch angle rotor with 1500-cubic-centimeter capacity and speeds to 11,000 revolutions per minute; (iii) swinging-cup rotor for zonal separation with 96-cubic-centimeter capacity, speeds to 12,000 revolutions per minute and forces to 21,500 times gravity. In addition see the models AA, AB, AT and AX centrifuges, all of which offer 400-cubic-centimeter capacity, speeds to 16,500 revolutions per minute and forces to 34,800 times gravity. Also on display will be the models SL and L with 1500-cubic-centimeter capacity, speeds to 11,000 revolutions per minute and forces 5 times greater than comparable volume centrifuges. The Lourdes' all-purpose Multi-Mixer, adaptable for a wider range of sealed homogenizing within stainless-steel containers, centrifuge test tubes, centrifuge bottles, and glass Mason jars will also be on display. Other Multi-Mixer adaptations include a swinging blade-scraper homogenizer assembly, a

tissue-grinding flexible coupling assembly, a Jacobs chuck assembly, and a continuous-flow, temperature-control container.

Microcard Corporation

Booth 23. The Microcard Corporation will have an exhibit of its product. A description follows: Microcards are normally 3- by 5-inch cards on special photographic paper bearing from 40 to 60 or more pages of microcopy and having a heading in full size type for rapid filing and retrieval. They are read by an easily operated and compact reading machine that magnifies the image to original size or larger on the screen. Microcards are very inexpensive and are practical in runs of 5 to 500 copies. They provide at least a 95 percent space saving and are ideally suited for the storage of reference material. They may be indexed in any desired manner. Among present applications are reproduction of laboratory manuals for intraplant use, replacement of back issues of technical periodicals in company libraries, reproduction and dissemination of test data or specifications, and duplication of basic technical library. Microcards can reproduce practically all forms of legible material. The manufacture of these cards is handled by the Microcard Corporation, West Salem, Wis.

Muscular Dystrophy Associations of America, Inc.

Mezzanine area. This exhibit illustrates all phases of muscular dystrophy and the measures taken to combat it. Spotlighted are the physical manifestations of the disease, both clinically, as it cripples the victim, and histologically, as normal muscle structure deteriorates. A series of eight stop-action pictures which light up in sequence shows how the disease impairs the patient's performance of a routine movement, getting up from the floor.

Miles Reproducer Company, Inc.

Booth 67. Case histories, lectures, and dictation may now be recorded at a 60-foot radius with Walkie-Recordall, an 8-pound self-powered, battery recorder-transcriber. It operates in or out of the closed briefcase, indoors or outdoors, while stationary, walking, riding or flying. It records in noisy places as interferences do not block recordings. The voice-activated, self-start-stop feature automatically starts and stops the recording from microphone or telephone, thus eliminating supervision and the recording of silent periods. While facilities for transcribing are available, transcription may be eliminated due to ease of handling identifiable, compact, indexed recordings without the delay of rewinding. Up to 8 hours of permanent recordings may be accumulated at intervals on an "endless" belt costing 25 cents.

National Geographic Society

Booths 70 and 71. The exhibit of the National Geographic Society will feature the *National Geographic Magazine* and the *Geographic School Bulletins*. Also on display will be maps, books, pictures, and other special educational materials of the society. An automatic projector will screen a continuous selection of natural color slides. The slides cover National Geographic field assignments and expeditions and were selected from illustrations by staff photographers of the *National Geographic Magazine*.

National Science Foundation

Mezzanine area. The National Science Foundation, an agency of the United States Government, was established in 1950 to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. Activities of the foundation include: (i) initiating and supporting basic scientific research through grants for research projects, for construction of facilities, for conferences and symposia, and for international travel; (ii) awarding predoctoral and postdoctoral fellowships; (iii) supporting programs for improving the quality of science teaching at the high-school and undergraduate-college level; (iv) fostering the interchange of scientific information among scientists in the United States and foreign countries; (v) providing a central clearing house for information concerning scientific and technical personnel; (vi) undertaking studies of the nation's present and anticipated scientific activities to assist the Federal Government in making policy decisions concerning scientific research and education in the sciences; and (vii) cooperating in international scientific research activities.

New York State Employment Service

Mezzanine area. The Engineering and Science Placement Unit of the New York State Employment Service will supply information about the labor market and about services available through the New York State Employment Service's Professional Office. For 15 years, industry and manpower have made this office their central hiring headquarters, and it is common procedure for employers throughout the country to call on the assistance of the Professional Office whenever they recruit in the New York City area. Staff members from the Professional Office will be available for consultation.

New York Telephone Company and Bell Telephone Laboratories, Inc.

Booths 47 and 48. This display shows some of the core materials used in magnetic amplifiers and some of the magnetic amplifiers that have been built from them. The 400 cycle per second hysteresis loops are shown to illustrate the differences between alloy variations in core materials and the effects of air gap. A servomechanism is shown which uses only magnetic amplifiers for activating a portion of the loops. The amplifier is cast in epoxy resin and was one of the first designs to use silicon diodes. The third panel displays a matrix of the magnetic amplifier which performs a binary-to-decimal translation. A four-digit binary "word" is fed into the magnetic amplifier as currents in four signal leads. The output of a magnetic amplifier is a voltage on one of ten output leads. This output is displayed on a neon tube that houses formed electrodes. This provides a readable display to the operator of a binary computer.

Office of Naval Research

Mezzanine area. Since its establishment 10 years ago, the Office of Naval Research has supported scientific research in nearly every major scientific field. Its dynamic hydrobiological research program, including studies in marine, estuarine, and fresh-water environments, is designed to identify, characterize, and wherever possible, to provide a basis for overcoming hydrobiological problems of concern to the Navy. During the past decade marine, estuarine and fresh-water biological research has become increasingly important because of rapid technological advances in the development and use of underwater equipment and operational techniques. The exhibit shows some of the hydrobiological problems of concern to the Navy: how marine plants and organisms can interfere with effective sonar operations by fouling and noise; bioluminescence, or biologically produced light that often permits easy detection of vessels at night; damage to wooden port structures and ship hulls and metallic substances subject to corrosion and deterioration caused by marine organisms; dangers caused by various types of venomous and toxic marine organisms to underwater swimmers and survivors of ship and plane disasters in the sea. A vigorous program of hydrobiological research is enabling the Navy to solve many of these problems and to perform its mission of protecting our country on and under the seas.

Olympus Optical Instrument Company

Booth 2. Olympus microscopes have for many years been of excellent quality both optically and mechanically. Our new streamlined models, however, have been much improved in every respect. You will find them beautiful as well as convenient to manipulate, all controls being located below the stage. Of the two major manufacturers of microscopes in Japan, the Olympus Optical Com-

pany is known as the pioneer of the microscope industry in that country. They make about 60 percent of all microscopes manufactured in Japan, their nearest competitor making about 20 percent while the remaining 20 percent is made by about 12 small optical companies. When you purchase an Olympus microscope, you can do so with confidence, knowing that it is backed by one of the world's largest makers of microscopes. We invite you to examine and compare one of the world's finest microscopes. The low cost of these instruments will be another surprise for you.

Oxford University Press, Inc.

Booth 38. Oxford University Press will display books and materials in the field of science. The highlight of our exhibit is our new book by John A. Moore, *Principles of Zoology*. This textbook places special emphasis on the principles of genetics, biochemistry, embryology, human physiology, and evolution. It is designed primarily for first year zoology courses and for use as a text in teaching zoology in the general biology course. However, Moore's highly readable yet authoritative style makes this a work that will have invaluable appeal both to scientists in other fields and to the lay reader. Enhancing the textual material are "Suggested readings" and approximately 200 illustrations, nearly all original. We invite you to leaf through this modern zoology book and all other Oxford scientific books on display.

Pergamon Press

Booth 65. Pergamon Press are publishers of international research journals such as the *Journal of Applied Radiation, Isotopes and Nuclear Medicine,* the *Journal of Nuclear Energy* (which now includes a complete translation of *Atomnaya Energiya,* the Russian journal of atomic energy), the *Journal of Inorganic and Nuclear Chemistry,* and some dozen other scientific journals. Pergamon also publish books in the fields of science and technology—and an important publication in the past year has been the *Progress in Nuclear Energy* series based on the Geneva Conference on the Peaceful Uses of Atomic Energy. Two recently inaugurated series of monographs are the *International Series of Monographs on Nuclear Energy* and the *International Series of Monographs on Inorganic and Nuclear Chemistry.* A division has just been started which will concern itself solely with the publication of symposia. Forthcoming titles include: "Second annual seaweed symposia," Trondheim, Norway, July 1955; "Conference on chemical aeronomy" sponsored by the Geophysics Research Directorate, Harvard University, June 1956; "Conference on cloud physics," Woods Hole, Massachusetts, September 1955, also sponsored by the Geophysics Research Directorate.

Phipps & Bird, Inc.

Booth 1. Interested in the basic sciences? Then you are sure to find equipment of interest in P&B's booth. Anything from freeze-drying to pipette-drying; psychology, physiology and biology —or general laboratory equipment. P&B will attempt to have a most versatile display for your pleasure. We will have a qualified instrument engineer present who will be ready at all times to consult with you on your past, present, or perhaps future instrument problems.

Polaroid Corporation

Booths 16, 17, and 18. Polaroid Corporation presents the new Polaroid land projection film, which produces a black and white positive transparency ready for projection 3 minutes after the photograph is taken. Visitors to the booth can see oscillographs, photomicrographs and pictures of themselves, all made on the spot, processed in the camera and then projected on a screen. A feature of the system is the Polaroid copymaker—a convenient device for laboratory, classroom, or office for making Polaroid transparencies or paper prints of documents, charts, other photographs, or sections from books and manuscripts. The Polaroid land projection film produces slides in two sizes—3¼ by 4 inches to fit standard lantern slide projectors, and 2¼ by 2¼ inches to fit a new 500-watt Polaroid projector. With a speed of 1000 (ASA equivalent exposure index) and high resolution and sharpness, the film when projected makes images of extraordinary brilliance and detail. A new communications tool, this system provides a cheap, convenient, and easy method for telling a story to a group. It is expected that wide application of the system will be made in fields such as teaching, engineering presentations, and industrial training.

Psychological Corporation

Booth 26. The Psychological Corporation is a professional consulting and publishing organization in the field of applied psychology. Its services are made available to its clients and customers in a number of forms. Among these are psychological test materials, marketing and opinion research, industrial consulting, evaluation and counseling, testing programs, and consultation. The continuing concern of the staff of the corporation is to maintain it as an effective economic enterprise. This depends on the performance of the professional staff and the collaboration of skilled nonprofessional employees. The combined effort is directed toward the maintenance of high quality standards in present work, the development of new commercially acceptable services, and the demonstration of the truly important contribution that applied psychology can make in many areas. At our exhibit we hope to have the opportunity to describe our activities in more detail to our fellow scientists.

Ronald Press Company

Booth 35. The Ronald Press Company invites members of the AAAS meeting in New York to visit Booth 35 to pick up free convention packets. The packets include travel timetables, city maps, and other information of local interest. Visitors' attention is also invited to the display of selected Ronald books in the fields of biological and botanical sciences, chemistry, conservation, engineering, forestry, geology and geography, history of science and technology, mathematics, philosophy, physics and astronomy, psychology and psychiatry, and sociology. Representing the Ronald Press Company at the New York meeting are John A. Behnke, vice president; and Alfred H. Renshaw, field representative.

Schwarz Laboratories, Inc.

Booth 29. Schwarz Laboratories is the oldest and largest producer in the world of nucleic acid and its related derivatives. As a leading manufacturer of yeast biochemicals, Schwarz Laboratories will be represented by members of its staff to answer questions about the more than 180 products of biochemical and medical importance now made by the company. The exhibit will include nucleic acid compounds, purines and pyrimidines, adenosine phosphates, nucleosides and nucleotides, sugars and sugar phosphates, glutathione compounds, sulfhydryl reagents, deoxynucleosides, optically standardized amino acids and kit, carbon-14, sulfur-35, and phosphorus-32 radiochemicals, and clinical preparations. Featured will be Schwarz preparations of importance in sulfhydryl studies, nucleotide and peptide synthesis, whole-blood preservation, cancer research, and in investigations in nutrition, metabolic and enzyme functions, tissue culture, and cardiac and vascular ailments.

The Science Library

Booths 19, 20, and 21. The Science Library is administered by the AAAS as an additional service to publishers of books, both exhibitors and nonexhibitors. It has become an integral part of each year's Annual Exposition of Science and Industry. In the Science Library, books of all publishers participating are grouped by fields of science —a convenience both to the visitor who is restricting his inspection of books to

a single category and to the one who wishes to browse. Among the publishers represented in the Science Library are American Association for the Advancement of Science; Addison-Wesley Publishing Company, Inc.; American Book Company; Annual Reviews, Inc.; R. R. Bowker Company; William Byrd Press, Inc.; John de Graff Inc.; E. P. Dutton & Co., Inc.; Emerson Books, Inc.; W. H. Freeman and Company; Galois Institute of Mathematics and Art; Paul B. Hoeber, Inc.; Henry Holt and Company; Houghton Mifflin Company; Interscience Publishers, Inc.; Iowa State College Press; Johns Hopkins Press; Lantern Press, Inc.; Little, Brown & Company, Inc.; Josiah Macy, Jr., Foundation; Prentice-Hall, Inc.; Reinhold Publishing Corporation; Row, Peterson and Company; W. B Saunders Company; Simon and Schuster, Inc.; University of Minnesota Press; University of North Carolina Press; University of Pittsburgh Press; D. Van Nostrand Company, Inc.; John Wiley & Sons, Inc.; World Book Company; Yale University Press.

Rayoscope Company

Booth 30. The Rayoscope is a rather new and efficient microprojector and its many uses will be demonstrated. Special emphasis will be placed on projection of living specimens for long periods of time on a screen at a distance so that groups of observers can see simultaneously. Customers are urged to bring their own specimen slides which they would like to project to large classes. You will thus be given an opportunity to make your own test of the effectiveness of microprojection.

Smith, Kline & French Laboratories

Area B. Smith, Kline & French Laboratories will have a series of photomurals with accompanying text to illustrate various aspects of the research and development program at Smith, Kline & French Laboratories. Particular emphasis is placed on company policies designed to give the research scientist an active voice in management without sacrificing his progress in his chosen field of research. For example, through company policy, the scientist is allotted free time for his personal research. He is encouraged to participate actively in scientific meetings and to publish the results of his experiments. At the same time, his representation on policy-making committees provides liaison between scientist and administrator and assures the scientist of frequent opportunities to express his views and to influence company policy.

Ivan Sorvall, Inc.

Booths 12 and 13. Ivan Sorvall, Inc., Norwalk, Conn., will display new stainless-steel rotors for their Servall small-, medium-, and large-capacity angle centrifuges. The famed SS-1 and SS-1A superspeed angle centrifuges, known worldwide as the "workhorse of the modern laboratory," will be shown along with the Servall superspeed refrigerated centrifuge. The Servall Porter-Blum microtome, automatic pipettes, and high-speed Omni-Mixer will be the other Servall instruments on display. The following LKB instruments will be shown: column electrophoresis apparatus, composite column for chromatography, paper electrophoresis equipment, filter-paper column, Polarolyzer, conductivity bridge, and Sjostrand ultramicrotome. The completely new Radi-Rac fraction collector for time, volumetric, and drop count methods, featuring collection of effluents in radii, circles and spirals, will be demonstrated for the first time in the United States.

Special Libraries Association, New York Chapter

Booth 22. The New York Chapter of the Special Libraries Association will exhibit materials to show what a special library is, what it does, and how it can assist scientists.

Stauffer Chemical Company

Booth 37.

United Nations

Mezzanine area.

United Scientific Co.

Booth 41. Many new Unitron microscopes for research, education and industry—including some exhibited for the first time—will be on display and in operation at the Unitron booth. Research workers will be particularly interested in the new inverted models which are of special value in the study of plankton and chemical reactions: the new Unitron inverted research model MIC with provision for 35-millimeter photography, and the universal camera microscope for bright-field, phase, and dark-field with built-in cameras for 3¼- by 4¼-inch, 35-millimeter, and 60-second Polaroid photography. With the inverted models, jars of specimen fluid may be placed directly on the microscope stage and examined at magnifications from 25 to 2000×. Educators will find many new, inexpensive models for classroom use, including laboratory, phase, autoillumination and stereoscopic types which formerly were priced out of the range of restricted school budgets. Biologists will have an opportunity to see for themselves how Unitron phase microscopes make living and other transparent specimens visible without staining. These remarkable instruments make the latest development in microscopy available for as little as $99 for a complete instrument. Other Unitron instruments to be shown include polarizing, stereoscopic, dissecting, binocular and metallurgical microscopes, the Unitron photomicrography set ACA, and Unitron astronomical telescopes.

Veterans Administration

Mezzanine area. This exhibit, entitled "Genesis of the rat skeleton," presents a comprehensive microscopic demonstration of the establishment of ossification centers in the rat. Ossification normally begins in the rat embryo during the 17th day after conception and proceeds so rapidly that within 1 week all diaphysial centers are established, and within an additional 3 weeks all epiphyseal centers are present. The photographed, alizarin-stained, cleared specimens are superior to radiograms. The rapidity and exactitude of the chronology of the establishment of ossification centers is demonstrated.

Walter Reed Army Institute of Research

Mezzanine area. The exhibit of the Walter Reed Army Institute of Research is entitled "Opportunities for allied scientists in the U.S. Army Medical Service," and will consist of color transparencies depicting the areas of utilization and opportunity of the Allied Science Branch of the Medical Service Corps. The exhibit will show that its members are regular and reserve Army officers trained in scientific and professional fields allied to medicine; that, working in their own specialties, they possess a combination of skills vital to the modern concept of medicine and that the expert services which they provide are indispensable as a supporting element of the Army's medical team.

W. M. Welch Manufacturing Company

Booths 57 and 58. The W. M. Welch Manufacturing Company will exhibit laboratory instruments for physics, chemistry, and biology departments including stainless-steel balances, high-vacuum pumps, electrical measuring instruments, electronics-teaching devices, Densichron for measuring optical density, color saturation, paper chromatograms, and so forth. Several additional pieces will be shown: mathematics teaching aids, microscopes, biological models, and preserved specimens. Several charts and sets of charts will be shown for teaching physics, physiology and biology.

Wild Heerbrugg Instruments, Inc.

Booth 49.

William Guild's Science Center

Mezzanine area.

News of Science

Some Highlights of Astronomy in 1956

The American Association of Variable Star Observers has released a compilation of the most outstanding astronomical events of 1956, as selected by Harlow Shapley, professor emeritus at Harvard University and Neilson professor at Smith College. These highlights were presented at the recent annual meeting of the AAVSO in Springfield, Mass. After commenting that the artificial satellite and the breathless growth of radio astronomy have monopolized the astronomical interest of the scientific public this year, Shapley named the following events:

1) At the top of the list of highlights should be the completion of the prolonged study by Milton Humason of Mount Wilson and Palomar Observatories of the radial velocities of several hundred galaxies, a work upon which we shall for long base our knowledge of the rate of expansion of the universe. The report of the work is published jointly with his colleagues A. R. Sandage and N. U. Mayall of the Lick Observatory.

2) Discovery of the antiproton by the nuclear physicists of Berkeley, Calif., which gives to cosmology a basis for strange speculations, as, for example, the suggestion by M. Goldhaber of the Atomic Energy Commission's Brookhaven Laboratory of an antimatter universe quite distinct and different from our proton cosmos—a sort of mirror image of it.

3) The beginning of the world-wide organization of amateur astronomers for the visual tracking of the artificial satellite, the launching and study of which is one of the semiastronomical projects of the International Geophysical Year.

4) The firm assurance, after 3 years of exploration and planning, that a large interinstitutional observatory will be located in the arid Southwest, possibly in Arizona, outfitted with an 80-inch reflector and equipment for precise photometry, and with the possibility of still larger instruments in the future for the study of sun, planets, and stars. The goal is to provide instruments chiefly for the use of astronomers located at institutions with unfavorable climates or with small research facilities. This project, underwritten by the National Science Foundation, is a companion enterprise to its establishment of the 140-foot-aperture radio telescope in West Virginia.

5) A convincing astrophysical theory by W. A. Fowler and Jesse L. Greenstein of the California Institute of Technology to account for the formation of the heavy elements in stellar interiors—a contribution of high importance in our rapidly increasing knowledge concerning the evolution of stars and of the stellar universe.

6) The completion, through publication, of the University of Michigan's great program of discovery and measurement of southern visual double stars, an enterprise of some 30 years duration, with R. A. Rossiter as the principal observer; he discovered more than 5500 new double stars (mostly faint), which establishes a record that probably will never be excelled.

7) Detection for the first time of red shifts in the radio spectrum of distant galaxies by A. E. Lilley and E. F. McLain of the Naval Research Laboratory, Washington, D.C., who found the speed of recession of a pair of galaxies (Cygnus A source) the same in the radio wave length as in the optical measures by W. Baade and R. Minkowski—namely about 17,000 km/sec.

8) Two special conferences of high importance at the McCormack (Va.) and Cook (Pa.) Observatories, the first to pool the continued worries of astronomers about the stellar distance scale and its revision, and the second to explore, with international participation, the future of precision instruments for measuring faint star light.

9) The dedication and putting into successful operation, under the general supervision of Bart J. Bok, of the 60-foot radio telescope at the George R. Agassiz Station of the Harvard Observatory, an instrument designed especially for research on the neutral hydrogen radiation of 21-centimeter wave length, with the structure of the Milky Way spiral arms as one of the principal objectives.

10) The dominance in the summer and autumn sky of the planet Mars, which was in early September a mere 35 million miles distant, permitting much intense study by spectrograph, photometer, and radio, of the planet's surface at this most favorable approach in many years.

11) The announcement from the Canadian Radio Physics Laboratory at Shirley Bay, of Project Janet, a development by P. A. Forsyth and colleagues for using the ionized trains of meteors for the transmission of radio messages over long distances, at least up to 1000 miles.

Fallout Hearings Proposed

The Joint Committee on Atomic Energy of the U.S. Congress has been asked to undertake a public investigation of nuclear fallout hazards. The following letter, signed by 130 members of the science and medical faculties of Washington University (St. Louis) was sent to the Joint Committee on 12 Nov.

"We have been increasingly disturbed by the AEC data released in recent months which indicate a possibility that fallout from nuclear explosions may be approaching a level which constitutes a serious, worldwide threat to health. We are further concerned that the greatly divergent interpretations placed on these data in the recent campaign may have resulted in widespread confusion. It seems that public decisions of the greatest importance may turn in part on the significance of the AEC's findings. It is therefore of immediate importance that a responsible agency of the government review in public the complete findings of the AEC, together with their most authoritative scientific interpretations. We strongly urge that the Joint Committee on Atomic Energy undertake open hearings on these matters at the earliest possible date."

Bioflavonoids and Colds

Bioflavonoids, the citrus fruit extracts recently cited as a new aid in combating the common cold, are actually unable to prevent colds, shorten their duration, or even add to the symptomatic relief provided by a standard preparation used for this purpose, according to the findings of two separate studies reported in the 24 Nov. issue of the *Journal of the American Medical Association*. The studies also showed that bioflavonoids can do nothing to enhance the value of vitamin C, which has been used to build up the body's general strength and resistance and also to help strengthen the capillary walls against a viral invasion. However, one of the studies did indicate that vitamin C may help shorten the duration of a cold.

The first study, conducted among 89 medical students and student nurses by Henry L. Heyl and Warren L. Franz of

the Hitchcock Foundation and the Dartmouth Medical School, concluded that "when used alone [the bioflavonoid] produced the same results as a placebo. When used with vitamin C, the results were comparable to those with vitamin C alone."

The other clinical study, covering more than 1900 cold sufferers, chiefly industrial workers, also concluded that bioflavonoids have "a singular lack of effect" against the common cold. This study was conducted by Harry E. Tebrock, medical director of Sylvania Electric Products, Inc.; Joseph J. Arminio, Ossining, N.Y.; and John Howard Johnston, medical director of Pratt-Whitney and Company, Inc., West Hartford, Conn.

First AEC Awards Ceremony

The Atomic Energy Commission has established an annual awards ceremony to be held in Washington, D.C., an occasion for granting the highest recognition that the commission can extend to its employees. Twenty-two present and former employees of the headquarters and field offices received special AEC honor awards at the first such ceremony, which was held on 14 Nov. All those cited for distinguished service and outstanding service received the AEC medal; gold for the first category and silver for the second. Accompanying cash awards went to all recipients who are still members of the commission's staff. Six former employees who received high awards in earlier years were also present to receive the AEC medal, which has been struck since those awards were made.

Those who received the Distinguished Service award are Richard W. Cook, deputy general manager, Washington; Jesse C. Johnson, director, Division of Raw Materials, Washington; William Mitchell, general counsel, Washington; and Charles Vanden Bulck, assistant manager for administration, Oak Ridge (Tenn.) Operations Office.

Outstanding Service awards were given to the following people.

From the Washington headquarters office: Amasa S. Bishop, former chief, Controlled Thermonuclear Branch, Division of Research, now commission representative in Paris; Spofford G. English, chief, Chemistry Branch, Division of Research; Paul C. Fine, director, Office of Operations Analysis and Planning; Lawrence P. Gise, assistant director, Division of Military Application; Arthur E. Gorman, chief, Sanitary Engineering Section, Engineering Development Branch, Division of Reactor Development; Charter Heslep, senior information specialist, Division of Information Services; James L. Kelehan, former assistant general manager for administration, now with Ryan Industries, Detroit, Mich.; George C. Taylor, assistant director for supply, Division of Construction and Supply; Algie A. Wells, attorney, Office of the General Counsel.

From field offices: Kenneth A. Dunbar, manager, Portsmouth (Ohio) Area Office; Richard G. Elliott, director, Office of Information, Albuquerque (N.M.) Operations Office; Henry B. Fry, former assistant manager for administration and services, Albuquerque Operations Office, now with General Dynamics Corporation, San Diego, Cal.; Lawton D. Geiger, manager, Pittsburgh (Pa.) Area Office; George P. Kraker, deputy manager, Albuquerque Operations Office; Jarvis L. Schwennesen, chief, Chemical Processing Branch, Operations Division, Idaho (Idaho Falls) Operations Office; James C. Stowers, former manager, Kansas City (Mo.) Area Office, now with ACF Industries, Washington, D.C.; Donald G. Sturges, former director, Operations Division, Hanford (Washington) Operations Office, now with Carborundum Company, Niagara Falls, N.Y.; Emery L. Van Horn, manager, Brookhaven (N.Y.) Area Office.

The following former employees who had earned high awards in earlier years received the AEC medal.

Walter J. Williams, former deputy general manager, now vice president of Taconite Contracting Corporation, Duluth, Minn.; Lawrence R. Hafstad, former director of the Division of Reactor Development, now vice president for research, General Motors Corporation, Detroit, Mich.; Roy B. Snapp, former special assistant to the chairman, now a consultant in Washington, D.C.; K. D. Nichols, former general manager, now a consultant in Washington, D.C.; John C. Bugher, former director of the Division of Biology and Medicine, now director, Medical Education and Public Health, the Rockefeller Foundation, New York City; Richard W. Alger, former chief, Engineering Branch, Division of Construction and Supply, now an architectural consultant to the division.

New Neurological Research Foundation

The National Neurological Research Foundation, established in memory of Dora Browning Donner, has been chartered in Washington, D.C., where its address is 3255 N St., NW. The foundation's aim is to encourage young men and women who show promise in research to pursue a career in neurology and related fields of science. This will be done largely by granting fellowships for terms of approximately 5 years with stipends of about $10,000 a year.

It is hoped that by giving the investigator full scope in studying the degenerative diseases of the nervous system, such as Parkinson's disease, multiple sclerosis, amyotropic lateral sclerosis, senile psychosis, muscular dystrophy, cerebral palsy, as a whole and in their relation to one another, rather than in an isolated fashion, that the accumulation of knowledge leading to the prevention and cure of these diseases will be accelerated. It is further hoped that by not fragmenting research funds and by giving all funds available for distribution to the Scientific Advisory Committee, except for the cost of secretarial services, the Foundation will also further this end.

Donors will be informed of the name, address, and nature of the research of the investigator whose work they support. The Scientific Advisory Committee, which will direct the assignment of funds both for fellowships and for research grants, consists of Raymond D. Adams, Edward M. Dempsey, Louis S. Goodman, Seymour S. Kety, Oliver Lowry, Horace W. Magoun, James L. O'Leary, and A. Earl Walker.

The General Advisory Committee (list incomplete) who will take an active part in directing the foundation, consists of: Thomas Bradley, James B. Campbell, John J. Conley, W. T. C. Gaynor, Franz J. Kallman, J. Lawrence Pool, Dominick Purpura, Cornelius Rhoades, Frederick L. Stone, Mrs. Joshua Cosden, Darragh A. Park, Jr., Mrs. George A. Rentschler, and Mrs. Sidney Scott.

The officers and trustees are as follows: honorary president, Fuller Albright; treasurer, Carnum L. Colton; chairman, William Marvel; vice chairman, Mark D. Altschule; secretary, Mrs. Rodgers Denckla; Mrs. Fuller Albright, W. Donner Denckla, Mrs. Charles A. Munn, Jr., and J. Lawn Thompson.

Deep-Sea Diving Record

George G. Wookey, who is a senior commissioned boatswain in the British Navy, recently dived 600 feet into Norwegian waters in a helmeted diving suit, beating the 535-foot record set in 1948 by Petty Officer William Bollard. H.M.S. *Reclaim*, an experimental diving ship, supplied Wookey with a mixture of oxygen and helium to breathe. The use of this mixture is new; it enables a diver in a flexible suit to work at a depth of 430 feet for a maximum of 20 minutes with as much ease as a diver breathing air at a depth of 100 feet.

The most dangerous part of such diving is the period of decompression needed to avoid the bends. For a depth of 600 feet this period is 5½ hours. When it is time for a diver to come up, a decompression chamber (a vertical cylinder with a door at each end) is

lowered, complete with attendant, and at a certain stage of the ascent the diver enters the chamber through the lower door. The attendant then takes charge. The pressure in the chamber is gradually lowered to the surface pressure, and pure oxygen is administered to the diver to hasten the elimination of the helium from the tissues of his body.

British Antarctic Expeditions

Two British Antarctic expeditions left on 15 Nov. aboard the 2100-ton vessel *Magga Dan*. One group of 11 consists of members of the British Commonwealth Trans-Antarctic Expedition, led by Vivian E. Fuchs. It will attempt the first 2000-mile crossing of the Antarctic Continent.

The second group is part of Britain's contribution to the Antarctic phase of of the 1957–58 International Geophysical Year. Its 21 members are led by Col. Robin Smart, who is also the expedition's medical officer. The *Magga Dan* is functioning as a weather ship on her journey to the Antarctic, relaying meteorological data back to Britain.

Scientists in the News

JULIUS A. KRUG, former Secretary of the Interior, has been appointed leader of a United Nations Technical Assistance Administration team of experts that will advise the Government of Pakistan on flood control and water utilization. He is accompanied by WALTON SEYMOUR, consultant on the economic and management aspects of water use and development who was formerly director of the program staff of the Department of Interior under Krug. Both have held positions in the Tennessee Valley Authority. Seymour's services have been made available by special arrangement with the Puerto Rican Water Resources Authority, which he is now serving as a consultant. The flood-control program will deal especially with the Brahmaputra-Ganges basin in East Pakistan.

Krug will stay in Pakistan only a few weeks. On a second visit early in 1957 he will supervise the completion of the studies to be carried out by his associates and the preparation of recommendations to the Pakistan Government regarding steps for a long-term program. Seymour will remain in Pakistan for a longer period.

E. HUGH LUCKEY has been named physician-in-chief of New York Hospital and professor and head of the department of medicine of the affiliated Cornell University Medical College. Luckey has been dean of Cornell University Medical College and associate dean of the Graduate School of Medical Sciences since 1954 but will relinquish these posts when he assumes his new duties next July.

HORACE W. MAGOUN, professor of anatomy at the University of California, Los Angeles, delivered the 24th series of Thomas William Salmon lectures last month at the New York Academy of Medicine. He spoke on "The waking brain," with particular reference to the role of the reticular system in wakefulness and behavior.

This fall Magoun is spending his sabbatical leave as visiting scientist at the National Institute of Mental Health in Bethesda, Md.; in addition he is commuting on Saturdays to the Institute for the History of Medicine at Johns Hopkins University. His current research interests are directed, respectively, to contemporary and historical aspects of the relations of the mind with the brain.

The following appointments have been announced by the University of Utah College of Medicine.

CARLTON C. HUNT, professor of physiology at Einstein University, has been appointed professor and head of the department of physiology. He succeeds HORACE W. DAVENPORT, who left Utah early this year to assume similar duties at the University of Michigan.

NORMAN WEISSMAN of the State University of New York College of Medicine became associate professor of pathology on 1 Nov.

ERIK L. NOACH, associate professor of pharmacology, State University of Leiden, the Netherlands, is spending a research fellowship year in the department of pharmacology. Noach received a Fulbright travel grant, and his fellowship is under the auspices of the International Council of Pharmacologists, with funds provided by the Riker Laboratories, Inc.

HOMER E. STAVELY, formerly director of the pharmaceutical research division at the Commercial Solvents Corporation, Terre Haute, Ind., has been appointed director of biochemical research for Mead Johnson and Company, Evansville, Ind.

WILLIAM G. LENNOX of Boston, Mass., associate professor emeritus in neurology at Harvard Medical School, has received the American Pharmaceutical Manufacturers' Association award. He has long been a leader in neurological research, and he is a specialist in epilepsy and in the use of psychotherapeutic agents in the treatment of mental diseases.

CARL F. FLOE and MALCOLM G. KISPERT have been appointed assistant chancellors of Massachusetts Institute of Technology, according to Julius A. Stratton, chancellor. Floe is professor of metallurgy and, since 1952, has served also as assistant provost. Kispert, a graduate of the department of aeronautical engineering, joined the staff of the president in 1946 to assist Karl T. Compton and, since 1952, has been executive assistant to President James R. Killian, Jr.

ALEXANDER G. KARCZMAR, formerly an associate member of the pharmacology section, Sterling-Winthrop Research Institute, Rensselaer, N.Y., has been appointed professor of pharmacology and therapeutics at the Stritch School of Medicine, Loyola University (Chicago).

Col. MAURICE W. HALE, who is retiring from the Army after 30 years of active duty, has been awarded a certificate of achievement for outstanding work as director of the division of veterinary medicine at Walter Reed Army Institute of Research, Washington, D.C. He was cited for "exemplary ability as a research administrator and as a teacher."

DONALD W. PATRICK, director of the Clinical Center of the National Institutes of Health, Bethesda, Md., has been appointed medical officer in charge of the Public Health Service Hospital at San Francisco, Calif. He succeeds KENNETH R. NELSON, who has been transferred to Washington, D.C., where he is associate chief of the Bureau of Medical Services.

MARTHA M. ELIOT, chief of the Children's Bureau, has resigned to become professor and head of the department of maternal and child health on the faculty of public health, Harvard University. She will assume her duties 1 Jan., when she will succeed HAROLD COE STUART, who has headed the department since its founding in 1927. He has asked to be relieved of administrative duties to concentrate on research in child growth and development. (Two other women hold professorships at Harvard. They are Cora Du Bois, an anthropologist, and Cecilia Payne-Gaposchkin, an astronomer.)

Dr. Eliot has been associated with the Children's Bureau for 30 years, has been an official in it for 25 years, and for the last 5 years has been its chief. President Eisenhower said in accepting her resignation:

"I trust you take with you the deep satisfaction that you have so rightfully earned for the splendid leadership you have given over the years to the cause of better health and welfare for children,

not only in our own nation but around the world. Your contributions to this cause have been invaluable."

Dr. Eliot's service with the bureau had one break. From April 1949 to April 1951 she served as assistant director general of the World Health Organization, Geneva, Switzerland. For years she has been an internationally recognized leader in the health field. She is the United States representative on the board of the United Nation's Children's Fund.

Dr. Eliot received her A.B. degree at Radcliffe College in 1913 and her medical degree at Johns Hopkins in 1918. She served as a pediatrician in several hospitals before joining the Children's Bureau in 1924 to direct one of its first researches—on the prevention and control of rickets in children. These researches were done at Yale University.

A later and more spectacular program of the bureau further helped to make Dr. Eliot widely known. She was in charge of the Emergency Maternity and Infant Care Program of World War II. Under this program the wives and babies of 1.5 million servicemen received medical care through a subsidy provided by the Federal Government. Dr. Eliot's work in making this program a success has been credited with modernizing cost accounting in hospitals.

In 1947 Dr. Eliot was the first woman to be elected president of the Public Health Association. The organization then had been in existence 72 years. When she resigned her post, Dr. Eliot left as her last major pamphlet a 40-year history of the bureau.

R. H. DE MEIO, associate professor of biochemistry at the Jefferson Medical College of Philadelphia, has been invited to organize the teaching and research in biochemistry for the Faculty of Medicine of the University of Litoral, Rosario, Argentina.

Lt. Col. HERBERT B. NICHOLS, information officer for the U.S. Geological Survey, has been recalled to active military duty and assigned to the staff of Rear Adm. Richard E. Byrd, officer in charge of United States Antarctic programs (Operation Deepfreeze). Nichols is accompanying the naval support group that is establishing the Weddell Sea station.

CHANDLER McC. BROOKS, chairman of the department of physiology at the College of Medicine at New York of the State University of New York, recently delivered the annual Margaret Barclay Wilson memorial lecture, which is sponsored by the department of physiology, health, and hygiene of Hunter College in honor of its founder and first chairman.

Recent Deaths

HARRY A. BRAY, Saranac Lake, N.Y.; 76; retired medical director of the Ray Brook State Tuberculosis Hospital who formerly had taught at the Cornell and Albany medical schools; 15 Nov.

JOHN EVERSHED, London, England; 92; former director of the Kodaikanal and Madras Observatories in India; 17 Nov.

MARTIN HENZE, Pasadena, Calif.; 83; retired professor of biochemistry at the University of Innsbruck; former member of the staff at the Zoological Station, Naples, Italy; 6 Oct.

JOSEPH A. LE CLERC, Jacksonville, Fla.; 83; retired senior chemist with the U.S. Department of Agriculture; 16 Nov.

GUSTAV S. NORDBERG, Oneonta, N.Y.; 74; professor emeritus of psychology and philosophy and former dean at Hartwick College; 15 Nov.

ROBIN PEARSE, Toronto, Canada; former professor of urology at the University of Toronto; 19 Nov.

ROBERT WARTENBERG, San Francisco, Calif.; 69; clinical professor emeritus of neurology at the University of California Medical School; 16 Nov.

Education

■ The astronomy department of Mount Holyoke College celebrated the 75th anniversary of the John Payson Williston Observatory on 7 Nov. Highlight of the celebration was a lecture by Bart Bok of the Harvard Observatory, who discussed "Radio signals from the Milky Way." The lecture was preceded by a banquet, at which the history of astronomy at the college was reviewed by four speakers: Alice H. Farnsworth, director of the observatory, Helen Sawyer Hogg of the University of Toronto; Dirk Brouwer of Yale University, and Harlow Shapley, William Alan Neilson professor at Smith.

The observatory and the 8-inch Clark refractor and other equipment were presented to Mount Holyoke Seminary in 1881 by Mrs. and Mrs. A. Lyman Williston as a memorial to their 14-year old son. From 1853 to 1881 the seminary employed a 6-inch refractor on the campus. This refractor was then removed to Huguenot College in South Africa, daughter college of Mount Holyoke, and the transit of Venus in 1882 was successfully observed with the new 8-inch in South Hadley and the 6-inch in South Africa.

■ The Special Training Division of the Oak Ridge Institute of Nuclear Studies has announced that its 1957 course schedule will include a special 2-week course in radiation chemistry for scientists who are interested and active in the field and for teachers of college and university graduate courses. The radiation-chemistry course will be held from 25 Mar. to 6 Apr. It will cover the principal phases of radiation chemistry and physics, with emphasis on basic principles rather than detailed applications. The course will be limited to 90 participants, to be selected primarily on the basis of training and experience. Application blanks must be received *by 1 Feb. 1957*.

The Special Training Division's regular 4-week basic courses in 1957 are scheduled to open on 7 Jan., 4 Feb., 29 Apr., 27 May, 24 June, and 9 Sept. The first four of these courses are already filled. Prospective applicants for the remaining two should submit applications immediately to insure consideration.

Two-week courses in veterinary-radiological health for members of the Armed Forces Veterinary Corps will begin on 4 and 18 Mar. These courses provide indoctrination in radiological health and instruction in the evaluation of problems of radiation phenomena, particularly in relation to their biological effects and the possible or potential factors involved in the radiocontamination of food-producing animals or animal food products. Further information and application blanks for all of these courses may be obtained by writing to Dr. Ralph T. Overman, Chairman, Special Training Division, Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.

■ The Marine Biological Laboratory at Woods Hole, Mass., is offering a training program in nerve-muscle physiology. The program will be under the direction of S. W. Kuffler, C. L. Prosser, and G. B. Koelle. Opportunities to discuss problems in nerve-muscle physiology and to use experimental electrophysiological and histochemical techniques will be available during June, July, and August 1957.

Financial aid will be provided to nine pre- and postdoctoral fellows. Applications should be made to the Director, Marine Biological Laboratory, not later than *1 Jan. 1957*. This program is being supported in part by a training grant of the National Heart Institute.

■ The California Institute of Technology has dedicated its new Norman W. Church Laboratory for Chemical Biology. The building, put up at a cost of more than $1,500,000, now houses a staff of 70 researchers and technicians and is equipped for the most advanced techniques in modern chemistry and biology.

At a dedication dinner, guests heard an address by Warren Weaver, vice president for natural and medical science of the Rockefeller Foundation. In the past 7 years the Rockefeller Foundation has given the institute $700,000 in support of

its research in chemical biology, and has recently given another $800,000 for the future of the program. Additional supporting funds for the new building and equipment have been given by the National Foundation for Infantile Paralysis, the Carl F. Braun Trust Estate, the Ford Foundation, and a number of anonymous donors. Research work in the new Church Laboratory will be directed by AAAS retiring president George W. Beadle, chairman of the division of biology, and Linus Pauling, chairman of the division of chemistry and chemical engineering.

Grants, Fellowships, and Awards

■ The U.S. Atomic Energy Commission has announced the award of 26 unclassified physical research contracts with universities and private research institutions. Three are new contracts, and the remainder are renewals of contracts that have been in force.

■ The National Science Foundation is accepting applications for a new program of science faculty fellowship awards. The primary purpose of these awards is to provide an opportunity for college and university science teachers to enhance their effectiveness as teachers. Fellowships are offered for study in the mathematical, physical, medical, biological, engineering, and other sciences, including anthropology, psychology, geography, and certain interdisciplinary fields. Approximately 100 awards will be announced on 20 Mar. 1957.

Science Faculty fellowships are available to any citizen of the United States who holds a baccalaureate degree or its equivalent, has demonstrated ability and special aptitude for science teaching and advanced training, has taught at the collegiate level as a full-time faculty member for not less than 3 years, and intends to continue teaching.

Stipends will be individually computed in such a way as to match as closely as possible the regular salary of recipients. In the event that a recipient has supplemental support during his tenure, the amount of his award will be reduced accordingly. The foundation's award will be adjusted so that in no case will the combined support—from the foundation and other sources—exceed $10,000 per year. Additionally, allowances will usually be made to assist in defraying costs of travel and certain other expenses associated with the fellowship study.

Fellows may study at any accredited nonprofit institution of higher education in the United States or similar institution abroad approved by the foundation. Tenures of from 3 to 15 months are available.

Application materials may be obtained from the Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D.C. Completed materials must be received not later than *14 Jan. 1957*.

In the Laboratories

■ At the recent dedication of Consolidated Electrodynamics Corporation's new Engineering and Research Center, Alan T. Waterman, director of the National Science Foundation, said that U.S. industry is spending only 4 percent of its research and development funds on pure research. The remainder, or 96 percent, is earmarked for applied research.

Because of this disparity, Waterman commented: "We must look to the universities for these fundamental studies that are basic to scientific and technological progress. But unfortunately, the schools are faced with mounting costs, teacher shortages, and lack of funds and cannot carry out a complete program in these basic sciences." Waterman also pointed out that "The responsibility for correcting the present lack of emphasis on basic research, however, is one which all of us—the Government, private industry, and the community at large—must share."

■ A 50-kilowatt nuclear research reactor to be located at the University of Frankfurt in West Germany will be built by Atomics International, a division of North American Aviation, Inc. To be built under a contract with the German firm of Farbwerke Hoechst, the reactor will be used for radiochemistry, materials and medical research, general research in the nuclear field, and the production of radioisotopes at the university. It is scheduled for completion in the summer of 1957.

■ A new research laboratory building for the J. T. Baker Chemical Company, Phillipsburg, N.J., was dedicated on 26 Oct. Arthur C. Cope, chairman of the department of chemistry at Massachusetts Institute of Technology, gave the dedicatory address.

The new structure has 15 separate laboratories, each approximately 450 feet square. Several individual laboratories are equipped for organic exploratory work and are provided with distillation assemblies for purification of organic intermediates. Another laboratory has extensive equipment designed for polymerization studies. The antibiotic laboratories include special equipment for purification and isolation studies.

Five of the laboratories are especially fitted for various inorganic research projects. A special equipment laboratory provides space for assemblies that are too large or heavy for the usual laboratory. The instrumental laboratories are well equipped for physico-chemical studies, and with associated laboratories can carry out analyses of a nonroutine nature, including both microorganic and inorganic determinations.

Facilities are provided for a research staff of 60, including a 10,000-volume library. The company's research program is headed up by George E. Ham, director of research. E. C. Larsen is vice president and technical director.

Miscellaneous

■ The October 1956 issue of *Scientific Film Review*, published by the Scientific Film Association, 164 Shaftesbury Ave., London, W.C.2, England, contains details of 145 films on atomic energy and related subjects. This is the first comprehensive list of its kind. The information is arranged alphabetically by film title and there is a subject index covering the following categories: application of radioactive isotopes in agriculture, biology, chemistry, general surveys, handling, industry, metallurgy, and meteorology; atomic bomb and civil defense; equipment and apparatus; general surveys; moral, political, and religious problems; natural resources; nuclear reactors; occupational safety; progress reports; research centres and atomic energy plants; and theoretical aspects. Single copies of this issue are available direct from the Scientific Film Association at 3/6d each.

■ The proceedings are available for the International Symposium on High Energy Physics that took place last June at the European Organization for Nuclear Research (CERN) headquarters in Geneva. Some 300 nuclear physicists from 20 countries attended the sessions. These physicists included, in addition to the approximately 160 representatives from CERN's 12 member states, about 60 participants from the United States and 60 from the U.S.S.R. The two volumes of proceedings may be obtained from CERN, Service d'Information, Case postale 25, Geneva 15, Switzerland.

Erratum: In the article "How shall we pay for research and education?" by Paul E. Klopsteg [*Science* 124, 965 (16 Nov. 1956)], the first sentence under the subhead "Income taxes and individual giving" on page 966 should read: "Notwithstanding the apparent unqualified approval by government of the taxpayer's charitable inclinations, expressed by its permission to him to deduct up to 30 percent of his adjusted gross income for legal charities, he failed in 1954 by about $20 billion to take advantage of this exemption." The printed version "$20 million" was a typographical error.

Reports

Graying of Hair in Rats Fed a Ration Deficient in Lysine

As early as 1914, Osborne and Mendel demonstrated the essential nature of lysine for the growth of rats that were fed a diet containing zein as the sole source of protein. The rats were maintained at an almost constant body weight for 182 days, and they also showed no growth of hair (*1*). This result has been confirmed further by the studies of Rose (*2*) in which purified rations with mixtures of amino acids to simulate the composition of protein were supplied to rats. Smuts *et al.* (*3*) have also verified that lysine deficiency inhibits the body as well as the hair growth, but found no difference in the cystine content of the hair of normal and lysine-deficient rats.

In turkey poults, a deficiency of lysine has been shown to cause depigmentation of feathers (*4*); this implies an interference in the synthesis of melanin. It is of interest to find whether lysine deficiency has any effect on the graying of hair in a mammal such as the rat.

In the earlier studies, albino rats were used for determining lysine requirements and any graying tendencies would have been very difficult to notice. For this reason, black rats of the Long-Evans strain which are maintained in the animal husbandry department at the University of California, Davis, were used.

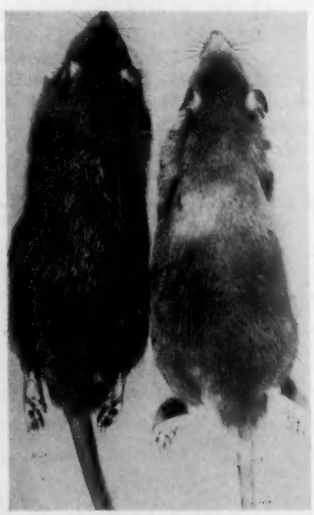

Fig. 1. Rats fed lysine-deficient and supplemented diets. Note the lighter coat color of the deficient rat on the right.

Five black male rats, weaned at about 21 days of age (not necessarily litter mates) were divided into two groups, A and B of 3 and 2 animals, respectively, and were maintained on a gluten-basal diet for a period of 25 days. Each 100 g of this ration contained the following components: glucose, 62.6 g; gluten (81 percent protein), 25.0 g; soybean oil, 5.0 g; HMV salt mix, 4.0 g; vitamin mix (Vohra and Kratzer, *5*), 2.0 g; choline chloride (25 percent), 0.8 g; DL-tryptophan, 0.12 g; DL-methionine, 0.1 g; dry vitamin A (10,000 units/g), 0.1 g; dry vitamin D_3 (1,500 units/g), 0.1 g; dry vitamin E (44 units/g), 0.1 g; biotin, 0.02 mg; and vitamin B_{12}, 0.001 mg. The rats were weighed two times a week and were found to gain an average of 0.8 percent of their body weight per day. After 25 days, the control group A was fed a sesame-basal diet (Vohra and Kratzer, *5*) which was slightly deficient in lysine and which has caused a depigmentation in turkey poult feathers. Group B was given the sesame-basal diet supplemented with 1.1 percent DL-lysine, which has proved to be adequate in preventing the depigmentation of poult feathers. Again, the feed and water were supplied *ad libitum*. A portion of the back of each rat was shaved to facilitate noting the change in color of the growing hair.

The sesame-basal diet produced growth of 3.5 percent daily gain, which was much more rapid than that produced by the gluten-basal ration, although it was not optimal. The addition of 1.1 percent of DL-lysine improved the growth of the rats to 4.1 percent daily gain.

The most noticeable difference in the two groups was in the color and texture of the hair coats (Fig. 1). The coats of the lysine-deficient rats were very much lighter in color and finer in texture than the dark black and coarse hair coats of the lysine-supplemented rats. This experiment has been repeated three times, and lysine deficiency has caused a graying of the hair each time.

From these experiments it may be concluded that lysine plays some role in the synthesis of melanin in the hair of rats as well as in the feathers of turkey poults.

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27 August 1956

Spontaneous Rewarming of the Hypothermic Curarized Dog

That striated muscle plays a leading role in the regulation of body temperature is a widely accepted concept. It is not certain, however, that this is the only source of heat production which is actively regulated in the process of maintaining normal body temperatures or whether there are other heat-producing mechanisms that are subject to thermostatic control.

Many years ago it was postulated that either shivering or chemical regulation or both were involved in maintaining normal temperature levels in a cold environment (*1*). The term *chemical regulation* was never made clear but was intended to represent a rise in metabolism due neither to muscular activity nor to increased muscular tension (*2*). Chemical agents or calorigenic hormones or both were considered possibly responsible. The findings of increased oxygen consumption and succinoxidase activity in liver tissue after chronic exposure of rats to cold have been presented as a direct demonstration of increased metabolism of visceral tissue. The mechanisms of these increases were not made clear (*3*).

DuBois (*4*) believed it quite possible that imperceptible tensing of muscles could account for all so-called "chemical regulation"; Burton and Bronk (*5*) and Sellers *et al.* (*6*) demonstrated that there was increased muscular tension and electric activity with resultant increased oxygen consumpion before shivering became overt. Following acute exposure to cold of dogs anesthetized with thiopentone, Ross and Werner (*7*) believed that they observed an initial spontaneous re-

Table 1. Rates of cooling and rewarming, rectal temperatures, and oxygen consumption of curarized dogs cooled in an ice and water bath. Averages are given below the short rules.

Dog weight (kg)	Control temp. (°C)	Temp. when removed from bath (°C)	Rate of cooling (°C/min)	Lowest temp. recorded (°C)	O_2 consumption at control temp. (cc/min)	O_2 consumption at lowest temp. % of control (%)	Rate of rewarming to 30°C (°C/hr)	O_2 consumption at 30°C % of control (%)
20.2	36.7	29.0	0.32	26.0	160	31	0.69	47
18.2	36.0	29.0	0.25	23.7	120	21	0.63	50
18.0	33.3	28.3	0.24	25.1	110	35	0.31	68
14.8	36.7	28.7	0.36	25.7	132	39	0.86	44
15.8	34.5	29.2	0.32	26.0	92	52	0.31	63
15.3	36.6	29.1	0.32	26.6	140	29	0.57	50
14.8	35.3	29.2	0.21	24.3	110	27	0.50	36
14.6	36.4	28.6	0.41	24.5	85	53	0.76	71
16.0	36.0	28.9	0.22	25.1	120	32	0.36	42
16.4	35.7	28.9	0.29	25.2	119	35	0.55	52

Table 2. Average values of mean arterial blood pressure and heart rate of nine curarized hypothermic dogs.

Item	Before curare	After curare	Before cold	Out of bath (28.9°C av.)	Lowest temp. (25.2°C av.)	30°C
Mean BP, mm-Hg	137	54	129	116	108	125
HR, beats/min	148	110	138	87	67	99

warming before shivering occurred or artificial rewarming was initiated.

The experiments reported here (*8*) show that body temperature may be restored to or toward normal following acute exposure to cold without increased striated muscle activity, and they support the hypothesis that heat-producing mechanisms other than muscular activity exist which regulate body temperature.

In order to insure complete inactivity of striated muscle, all animals in our experimental series were heavily curarized to the point of complete respiratory arrest and were maintained at this level throughout the experiments. The experimental procedure was as follows. Short-lasting anesthesia was obtained initially by giving 35 mg/kg of sodium pentothal intravenously. The trachea and appropriate blood vessels were cannulated, and the threshold stimulus of a motor nerve was determined. Ten LD of *d*-tubocurarine chloride (2 mg/kg) (*9*) was then administered intravenously, and artificial respiration was instituted at once; this was followed by 1.8 LD of *d*-tubocurarine every hour until the dog was sacrificed. At various intervals curarization was verified by demonstrating the inability of the stimulated motor nerve to cause muscular contraction.

Since blood pressure falls following curarization (*10*), time was allowed (approximately 1 hour) for the blood pressure to rise to normal before the dog was cooled. Each dog was placed in an ice and water bath (0°C) up to the neck and maintained there until the rectal temperature reached approximately 29°C, at which time the dog was removed, dried, and wrapped loosely in a woolen blanket to minimize heat loss. Animals were observed until the rectal temperature had rewarmed to 30°C or above; all experiments were conducted in a temperature-controlled room at 24°C.

Artificial respiration was given by means of a positive-negative phase pressure pump, because use of the negative phase has been shown to minimize the depression of blood pressure suffered by artificially respired animals in states of mild circulatory embarrassment (*11*). All animals were hyperventilated to reduce the tendency toward cardiac irregularity observed in hypothermic animals (*12*).

Table 1 summarizes data obtained from nine hypothermic curarized dogs. All dogs experienced a drop in rectal temperature of about 4°C after removal from the bath before spontaneous rewarming began. This drop in temperature occurred over a period of approximately 55 minutes. Before sacrifice, one dog rewarmed to 35.5°C, one dog to 34°C, five dogs to 31° to 32°C, and two dogs to 30°C. The rate of rewarming, however, was calculated for the time span between the point of lowest temperature and 30°C.

Table 2 shows that blood pressure was well maintained in all experiments. Cardiac irregularity in the form of a 2 to 1 block was observed as a transient phenomenon at the lowest temperatures in two experiments.

The data presented in this series demonstrate spontaneous rewarming with neither anesthetic depression nor increased muscle activity superimposed. To the best of our knowledge, this type of rewarming has not been previously reported in the literature. Since barbiturate anesthesia is well known to cause marked depression, it may be that the use of barbiturates has prevented others from observing the type of rewarming described here. We postulate that a thermogenic mechanism exists which is not operative when an animal is depressed.

Although Davis and Mayer (*13*) present evidence that in the rat there is a fraction of thermogenesis not due to reflex striated muscle contraction, it should be pointed out that the rats in their series were only partially curarized, whereas the dogs reported on here were completely curarized.

The increased metabolism of visceral tissue measured by You and Sellers (*3*) in cold-acclimatized rats might also occur in hypothermic animals to raise the body temperature. It is further possible that a factor produced in muscle may stimulate liver metabolism during hypothermia, as it does during normothermia (*14*). It seems unlikely that the rewarming process we describe can be attributed to the continuing release of epinephrine, since the period during which rewarming takes place is prolonged (about 9 hours from the lowest temperature to 30°C) (*15*).

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15. The opinions and assertions contained herein are the private ones of the writers and are not to be construed as official or as reflecting the views of the Navy Department or the naval service at large.

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9 October 1956

Contamination of Human Cell Cultures by Pleuropneumonialike Organisms

In the course of a study to determine the effect of pleuropneumonialike organisms of human and animal origin on various types of cell cultures available in the laboratories of the department of microbiology, School of Hygiene and Public Health, Johns Hopkins University, a human strain of pleuropneumonialike organisms was inoculated into tubes of HeLa cells. After 48 hours of incubation the fluid medium was removed from the inoculated and the uninoculated control HeLa cell cultures, and 0.1 ml of each was planted onto plates of pancreatic digest agar, using the method previously described for cultivation of pleuropneumonialike organisms (*1*). Growth of typical colonies of pleuropneumonialike organisms was noted on all plates, including the plates inoculated with the fluid from the control HeLa cell culture. This finding was checked and found to be reproducible.

Careful analysis of the experimental design has since shown that the isolated strain of pleuropneumonialike organisms could not have been introduced at the time at which the experiments were carried out. Following this observation, two other sublines of HeLa cell cultures maintained in the same laboratory by other workers, as well as a subline of conjunctival cells maintained in this laboratory, and a culture of HeLa cells recently purchased from a commercial laboratory were examined. The results are summarized in Table 1. It was estimated that there were 1000 to 5000 pleuropneumonialike organisms per milliliter of culture fluid in the positive HeLa cell cultures and 3000 to 10,000 organisms per milliliter in the human conjunctival cell culture (Fig. 1). The organisms from both sources grew well in subculture in liquid as well as on solid media. Growth in liquid media produced no turbidity.

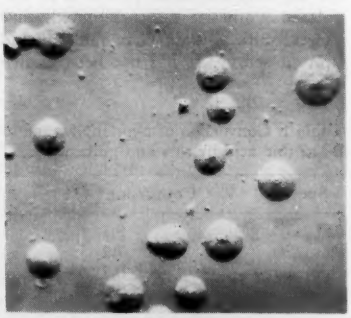

Fig. 1. Photomicrograph of colonies of pleuropneumonialike organisms from human conjunctival cell culture. (× 75)

It appears that sometime between October 1955 and April 1956 the main sublines of cell cultures became contaminated with pleuropneumonialike organisms, probably through some common constituent of culture media. It is of interest that for some time within this period, focal necrotic areas and considerable granulation of cells were frequently manifest.

Contamination of a tissue culture with an unknown agent later identified as pleuropneumonialike organisms has been encountered previously by other workers (*2*). Pleuropneumonialike organisms may easily escape detection or recognition unless they are specifically looked for. Their colonies are microscopic. In liquid media many strains, particularly those of human origin, produce either no turbidity or turbidity which is so slight that it is not readily apparent to the naked eye. They are filtrable microorganisms (*3*) and, therefore, are not removed by most routine filtration procedures used in the preparation of tissue-culture media. They survive freezing. Penicillin in concentrations customarily added to tissue-culture media has no effect on them. The effect of streptomycin of similar levels is variable, depending on the sensitivity of individual strains. The majority of strains of pleuropneumonialike organisms isolated from various sources are sensitive to antibiotics of the tetracycline series (*1*). The strains isolated from the HeLa cell cultures and from the subline of conjunctival cells were found to be sensitive to 4 μg oxytetracycline per milliliter and 256 μg streptomycin per milliliter.

Information regarding metabolic activities and nutritional requirements of members of the pleuropneumonia group is still incomplete (*4*). Recently a few data have become available regarding the effect of these organisms on living tissues. Potential cell parasitism and cell damage are suggested by the demonstration of intracytoplasmic inclusions due to pleuropneumonialike organisms (*5*) and by the abnormal appearance of the HeLa cell cultures examined by us. The undetected presence of pleuropneumonialike organisms may, therefore, invalidate or confuse observations made on presumably uncontaminated cultures.

Table 1. Data on cell cultures examined for presence of pleuropneumonialike organisms (*6*).

Cell culture	Growth of pleuropneumonialike organisms	Source	Maintenance
HeLa 1	+	JH*	Routine† by A
HeLa 2	+	JH*	Routine by B
HeLa 3	+	JH*	Routine by C
HeLa 4	0	JH*	Frozen October 1955
HeLa 5	0	CL	Obtained May 1956
Conjunctival	+	JH	Routine‡

* Strain originally obtained from CL (Commercial Laboratory) in summer of 1955, maintained at the department of microbiology, School of Hygiene and Public Health, Johns Hopkins University.
† HeLa cells: 40-percent human serum, 60-percent Hank's saline, penicillin 100 units/ml, streptomycin 100 μg/ml.
‡ Conjunctival cells: 10-percent human serum, 90-percent Eagle's medium, penicillin 100 units/ml, streptomycin 100 μg/ml.

The findings presented here indicate that tissue cultures or the components of tissue-culture media may be contaminated with pleuropneumonialike organisms and that this contamination is not readily apparent. Routine or at least frequent checks of the cultures and media for these organisms should be considered. In addition, the incorporation of a suitable level of one of the antibiotics of the tetracycline series may aid in the prevention of contamination by pleuropneumonialike organisms.

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6. Since this paper was submitted for publication, nine additional sublines of cell cultures were checked for contamination with pleuropneumonialike organisms. One of the sublines yielded growth of pleuropneumonialike organisms.

8 October 1956

Comparative Studies of Lipoproteins by Starch and Paper Electrophoresis

Previous investigations have been concerned with the cholesterol and phospholipid content of serum lipoproteins separated either by paper electrophoresis (*1*) or by starch electrophoresis (*2–4*). This study is concerned with comparative analyses of cholesterol and phospholipid in the various serum lipoproteins separated simultaneously by starch and paper electrophoresis (*5*). Normal serum and serums from patients with idiopathic hypercholesteremia and with idiopathic hyperlipemia were analyzed.

Starch electrophoresis was performed in two parallel blocks 8 by 36 by 1.5 cm using 2.0 ml of serum for each block and applying 450 volts and a current of 18 to 35 ma for 16 to 18 hours in a cold room at a steady temperature of 5°C. Barbiturate buffer of *p*H 8.6 and of ionic strength 0.05 was used. Extraction of the

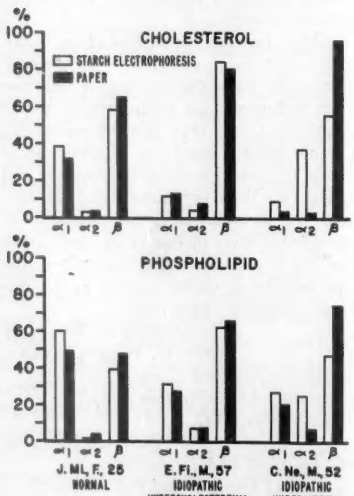

Fig. 1. Cholesterol and phospholipid contents in alpha-1, alpha-2, and beta lipoprotein fractions separated by starch and paper electrophoresis. No significant differences were observed between the two methods of electrophoresis in a normal person or, in persons with idiopathic hypercholesteremia. In idiopathic hyperlipemia, marked increase of cholesterol and phospholipid was seen in the alpha-2 lipoprotein by starch electrophoresis, whereas, by paper electrophoresis, these lipids were mainly increased in the beta lipoprotein.

starch segments (1 cm wide) was performed with a mixture of chloroform and methanol (2/1). The extracts were analyzed for total and esterified cholesterol (*6*) and phospholipid (*7*). Analogous segments of the second block were used for protein determinations by the biuret method (*8*).

Paper electrophoresis was performed in two parallel strips of Whatman 3-MM filter paper (15 by 30 cm) using 0.4 ml of serum and applying 250 volts and a current of 15 to 20 ma for 7 hours. A 2-cm-wide part of one strip was stained with Amidoblack 10B dye for localization of the protein fractions. The buffer and the lipid solvent were identical with those used in starch electrophoresis. Each paper segment (1 cm wide) was analyzed for total and esterified cholesterol and phospholipid (*6, 7*).

The control serum showed normal lipid partition: cholesterol, 228; phospholipid, 304; triglycerides, 28; and total lipids, 560 mg percent. The lipoprotein fractions alpha-1, alpha-2, and beta that were separated either by starch or by paper electrophoresis showed no significant differences in the distribution of cholesterol and phospholipid (Fig. 1).

In idiopathic hypercholesteremia, the serum was characterized by decided elevation of both cholesterol and phospholipid with a slight elevation of triglycerides and total lipids: cholesterol, 334; phospholipid, 328; triglycerides, 118; and total lipids, 880 mg percent. Regardless of the method of electrophoresis used, the cholesterol and phospholipid contents were markedly increased in the beta lipoprotein fraction and decreased in the alpha-1 lipoprotein fraction (Fig. 1).

In idiopathic hyperlipemia, the serum was characterized by lactescence and by marked elevation of all lipid fractions: total cholesterol, 776; phospholipid, 764; triglycerides, 1460; and total lipids 3000 mg percent. Marked differences in the distribution of cholesterol and phospholipid were observed with the two methods of electrophoresis. When starch was used as the supporting medium, elevation of cholesterol and phospholipid in the alpha-2 lipoprotein fraction was the prominent feature, whereas when paper was used the elevation of these lipids was seen in the beta lipoprotein (Fig. 1). By both methods, decrease of these lipids was observed in alpha-1 lipoprotein.

Considerable adsorption of serum triglycerides (chylomicrons) to the paper was noted at the point of application (*2*). A comparison of the distribution curves of cholesterol and phospholipid by the two methods of electrophoresis showed that large amounts of cholesterol and phospholipid were present in both alpha-2 and beta lipoprotein when starch electrophoresis was used, while the major pattern of these lipids was found in the beta lipoprotein by paper electrophoresis.

The adsorption of serum lipids at the point of application in paper electrophoresis interfered with the migration of some of the cholesterol and phospholipid molecules. When starch was used as supporting medium, no accumulation and adsorption of triglycerides was observed at the point of origin. The triglycerides migrated freely (*4*) and the cholesterol and phospholipid molecules migrated with them. This observation is probably related to the easier extractability of cholesterol "enmeshed in lipids" (*9*).

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31 July 1956

Missing Step in Guinea Pigs Required for the Biosynthesis of L-Ascorbic Acid

Man, other primates, and guinea pigs are the only mammals known to be unable to synthesize L-ascorbic acid; thus they require vitamin C in their diet to prevent scurvy. It has not been known

Table 1. Conversion of L-gulonolactone to L-ascorbic acid by rats and guinea pigs.

Species	Conversion* (%)
Rat	9.1
Rat	7.2
Guinea pig	< 0.2
Guinea pig	< 0.2

* Estimated from the amount of C^{14}-labeled L-ascorbic acid present in the animal 24 hours after intraperitoneal administration of 12-mg doses of L-gulonolactone-1-C^{14} (*3*).

Table 2. Conversion of L-gulonolactone to L-ascorbic acid in rat and guinea pig livers. Five milligrams of L-gulonolactone-1-C^{14} (0.6 μc) was incubated for 90 minutes at 37°C under air in 5 ml of a 10-percent homogenate (or microsomes from an equivalent amount of liver) in 0.15*M* phosphate buffer (*p*H 7.20) containing 0.13*M* sucrose. L-Ascorbic acid was isolated after addition of carrier (150 mg) from a 5-percent trichloroacetic acid extract of the incubation mixture as its 2,4-dinitrophenylosazone derivative (*3*).

Species	Conversion (%)
Homogenate	
Rat	12.0
Rat	8.0
Rat	3.6
Guinea pig	< 0.05
Guinea pig	< 0.05
Microsomes	
Rat	18.6
Rat	7.7
Rat	3.8
Guinea pig	< 0.05
Guinea pig	< 0.05

why these species are unable to synthesize L-ascorbic acid. This report presents results that point out a possible missing biochemical step in guinea pigs required for the synthesis of the vitamin.

Previous work has shown that L-ascorbic acid is formed from D-glucose in the rat by the following steps: D-glucose → D-glucuronolactone → L-gulonolactone → L-ascorbic acid. Evidence for this scheme comes from experiments in which the incorporation of C^{14} into L-ascorbic acid was measured after administration of various D-glucose tracers (*1*), uniformly labeled D-glucuronolactone (*2*) and carboxyl-labeled D-glucuronolactone and L-gulonolactone (*3*). Further evidence for this pathway in rats was presented by Isherwood and coworkers (*4*), who reported increased urinary excretion of L-ascorbic acid after administration of nonlabeled D-glucuronolactone and L-gulonolactone.

In the present study the role of L-gulonolactone as a precursor for L-ascorbic acid biosynthesis in rats and guinea pigs was compared. In contrast with the appreciable conversion of L-gulonolactone to L-ascorbic acid in the rat, no detectable conversion was observed in guinea pigs (Table 1). Similarly, results of experiments *in vitro* showed considerable synthesis of L-ascorbic acid from L-gulonolactone in homogenates of rat liver but none in those of the guinea pig (Table 2) (*5*). Cellular fractionation studies (*6*) showed that the conversion of L-gulonolactone to L-ascorbic acid occurs chiefly in the microsomes of rat liver, but no activity was detected in the microsomes of guinea pig liver (Table 2). Rat liver mitochondria possess about one-fourth of the activity of microsomes in converting L-gulonolactone to L-ascorbic acid, but none was found in the mitochondria of the guinea pig liver. The system for converting L-gulonolactone to L-ascorbic acid in the rat is apparently present only in the liver, since incubation of L-gulonolactone-1-C^{14} under identical conditions in homogenates of kidney, brain, small intestines, and muscle resulted in no synthesis of the vitamin (< 0.05-percent conversion).

These results showing that microsomes of guinea pig liver are unable to convert L-gulonolactone to L-ascorbic acid point out the possible missing biochemical step in this species needed for the synthesis of L-ascorbic acid. A more definite conclusion on whether this is the only step missing in guinea pigs will be possible when information becomes available on the enzymes required for the synthesis of L-gulonolactone from D-glucose.

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5. Unpublished experiments with L-ascorbic acid-1-C^{14} show that this compound is extensively metabolized in rat liver homogenates but to a lesser extent in guinea pig homogenate. The values reported in Table 2, therefore, represent minimum values for the conversion of L-gulonolactone to L-ascorbic acid in the rat liver.
6. Microsomes and mitochondria were prepared in isotonic sucrose by the method of W. C. Schneider and G. H. Hogeboom [*J. Biol. Chem.* 183, 123 (1950)].

12 October 1956

Uric Acid Metabolism and the Mechanism of Iron Release from Hepatic Ferritin

Previous studies in our laboratory have suggested that lowered oxygen tension is a stimulus for the release of iron from ferritin stores in the liver. During the hypoxia that attends the drastic hypotension of hemorrhagic shock, increasing quantities of iron appear in the plasma, in amounts almost sufficient to saturate the iron-binding capacity of the plasma. *In vitro* studies have shown that, as ferritin iron is reduced to the ferrous state, it becomes less tightly bound to the protein and can transfer across a membrane or be removed from ferritin in the presence of an avid iron-binding compound such as α,α′-dipyridyl or the iron-binding protein of the plasma (*1*).

Table 1. Accumulation of uric acid and its precursors (hypoxanthine and xanthine) in rat liver as a result of anaerobiosis. Incubation was carried out for 1 hour at 37.5°C in 100-percent oxygen or nitrogen.

Fraction	Uric acid	Hypoxanthine + xanthine
	(μmole/100 g wet weight of liver or equivalent of incubation medium)	
Incubation in oxygen		
Tissue	8.1	4.8
Medium	0.0	21.5
Total	8.1	26.3
Incubation in nitrogen		
Tissue	14.5	62.5
Medium	72.7	240.0
Total	87.2	302.5

The results of the present study (*2*) point to the involvement of the enzyme, xanthine oxidase, as well as the product of its activity, uric acid, in the reduction of ferritin iron. Slices of normal rat liver that are incubated in a nitrogen atmosphere in Ringer-phosphate solution liberate into the medium a substance that is capable of reducing ferritin iron. This compound has been identified as uric acid by means of its absorption spectrum, reduction of the uric acid reagent, and the disappearance of these two properties after incubation with the enzyme, uricase, which is highly specific for uric acid.

Analyses of both the liver slices and the medium in which they had been incubated (Table 1) revealed an over-all accumulation of uric acid. Of the rat tissues examined, liver, spleen, kidney, and small intestine, only the liver produced more uric acid in response to lowered oxygen tension; the others produced less. An examination of aerobic and anaerobic liver slices for their content of uric acid precursors, xanthine and hypoxanthine, showed a considerable accumulation of these compounds under anaerobic conditions (Table 1). This increase is presumed to result from depletion of high-energy compounds needed for synthetic reactions involving the purines, and from the resultant increase in catabolic reactions (*3*). Uricase, which is present in rat liver, was found to be much more sensitive to inhibition by lowered oxygen tension than xanthine oxidase.

Xanthine oxidase may act as a dehydrogenase in the presence of a suitable

acceptor, such as methylene blue or cytochrome *c* (*4*). The possibility was explored that ferritin might be reduced as a result of xanthine dehydrogenase activity under conditions of lowered oxygen tension. When ferritin was added to an anaerobic mixture of xanthine oxidase, hypoxanthine, or xanthine, and α,α'-dipyridyl to act as a trapping agent, the ferrous iron content of the system was increased 2.6 times. In this anaerobic reaction, the first reduction of ferritin iron must occur by virtue of its action as an electron acceptor, for no uric acid is formed in the absence of ferritin.

The reduction of inorganic iron by xanthine oxidase has been reported by Weber *et al.* (*5*) to be dependent on the formation of H_2O_2. The presence of oxygen in our system stimulated reduction of ferritin iron. This may be explained by the formation, in oxygen, of increased amounts of uric acid, which reduces more ferritin. The addition of crystalline catalase to the aerobic reaction mixture caused a further stimulation of ferritin reduction, presumably by protecting the enzyme against inactivation by H_2O_2. Therefore, H_2O_2 is apparently not involved in the reduction of ferritin iron.

A homeostatic mechanism for the regulation of plasma iron levels is suggested by these results. In addition, preliminary experiments indicate the presence in aerobic liver of a system (as yet uncharacterized) that is capable of oxidizing ferrous ferritin to the ferric state. In the normal aerobic liver, ferrous ferritin, formed as a result of the activity of xanthine oxidase on relatively low levels of hypoxanthine and xanthine, would be largely reoxidized. In the hypoxic liver, as a consequence of dehydrogenase activity on increased quantities of hypoxanthine and xanthine, more ferritin is reduced to the ferrous form and cannot be reoxidized. This results in increased levels of plasma iron.

In vivo confirmation of the role of uric acid in the release of ferritin iron to the plasma has been obtained from preliminary experiments carried out with S. Baez and S. G. Srikantia in our laboratory, using rats subjected to hemorrhagic shock. In such animals, we observe an increased plasma uric acid level, which cannot be accounted for solely by inhibition of kidney function caused by lowered blood pressure. Similar increases in plasma uric acid have been reported by others (*6*) without explanation of the mechanism involved.

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28 September 1956

Criteria for Assessing Effects of Drugs on Posttetanic Potentiation

There is considerable evidence that posttetanic potentiation (PTP) is a general synaptic property and is a normal consequence of synaptic excitation (*1–5*). Modification of the potentiating process by drugs (for example, *6–8*) provides clues to the nature of the phenomenon as well as information concerning the mechanisms of action of the drugs. Because of anatomical and physiological limitations on size of the efferent neuronal pool (in monosynaptic pathways of the spinal cord and in sympathetic ganglia), it is possible in some circumstances to modify profoundly the potentiating process without affecting the degree of PTP of synaptic transmission as tested in the usual manner, namely, by comparison of maximal synaptic discharges before and after tetanic stimulation. Jefferson and Benson (*9*) have shown that under certain conditions the total relevant motoneuron pool may be discharged during maximum PTP of the monosynaptic (2N) pathway of the spinal cord. Furthermore, at high levels of excitability such potentiation may be more than sufficient to lead to excitation of available motoneurons.

Figure 1*A* shows input-output relations in the 2N pathway of the spinal cord in the resting state (*10*) and during the period of maximum PTP (*11*) at various levels of reflex excitability as controlled by spinal cord temperature (*12*). With increasing size of maximum discharges at rest (*Y* intercepts of curves *a*, *b*, *c*, and *d*) the maximum potentiated discharges increase to a ceiling (curves *c'* and *d'*) imposed by limitations on available postsynaptic neurons. Curves representing PTP with time after tetanus at the corresponding levels of excitability show that the maximum posttetanic discharges must be the same for all curves (*c' c''*; *d'*, *d''*) on this ceiling.

Therefore, when the input-output

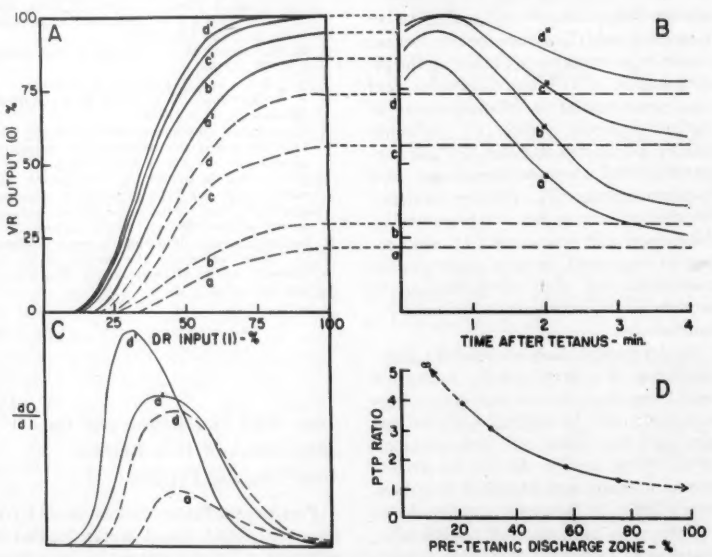

Fig. 1. Various aspects of PTP in the monosynaptic pathway of the spinal cord studied at four levels of excitability. (*A*) Experimentally determined input-output curves at rest (*a–d*) and during the peak of PTP (*a'–d'*). Excitability was altered by varying spinal cord temperature. Temperatures for curves *a–d* were 36°C, 35°C, 32°C, and 30°C, respectively. Unanesthetized spinal cat, DR-VR (S_1) preparation. (*B*) Curves illustrating time-course of PTP at the various levels of excitability. (*C*) Curves illustrating distributions of synaptic thresholds for several of the curves in *A*, obtained by graphical differentiation of corresponding input-output curves. Areas under curves are proportional to respective discharge zones in *B*. (*D*) relationship between PTP ratio and discharge zone at rest. Values plotted are those obtained from the *Y* intercepts of *A*.

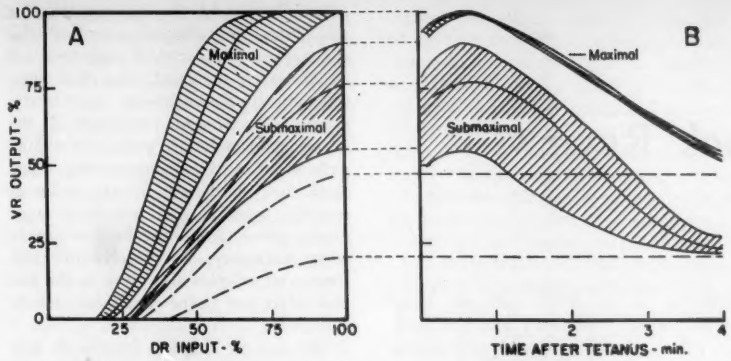

Fig. 2. A comparison of the ways in which changes in the potentiating process are expressed by input-output curves (*A*) and curves representing the time-course of PTP (*B*). Two levels of excitability are shown: "Maximal" in which the potentiated discharge reaches the maximum over all degrees of PTP and "submaximal" in which the potentiated discharge never reaches the maximum. The curves are generalized from 31 spinal cord experiments.

curves (*A*) during PTP tend toward this ceiling, increases or decreases in the potentiation process, as revealed by these curves and reflecting changes in synaptic threshold (*C*), may not be fully indicated by the method of testing employed in *B*. Curves expressing these relationships are shown in Fig. 2. In the "maximal" region, changes which fail to lower the input-output curves from the ceiling give no evidence of an alteration in PTP when tested in the usual manner, except for small changes in the time-course of potentiation.

The curves of Fig. 2 are based on results obtained in a study of the effects of diphenylhydantoin (Dilantin) on synaptic transmission (*7, 8, 13*). Dilantin has negligible effects on the level of reflex excitability of the spinal cord and on synaptic threshold at rest. On the other hand, the drug consistently produces a shift to the right in the input-output curves obtained during PTP. The expected decrease in PTP, however, is revealed only when testing is performed in the "submaximal" zone.

In examining means of avoiding the pitfall just described, consider first the simplest situation, that in which the level of excitability at rest is not influenced by the drug. It is apparent that effects of drugs on PTP can be assessed in three ways: (i) Input-output relations can be determined directly, at rest and during PTP. (ii) PTP may be studied in the usual fashion after it has been determined that testing is being carried out in the "submaximal" zone. If the initial level proves unsatisfactory (that is, in the "maximal" zone), then a more desirable level may be found by raising the temperature (see, for example, Fig. 1*A*) or, alternatively, by reducing the number of afferent fibers subjected to stimulation. (iii) PTP may be tested in the usual way but following a tetanus with either frequency or duration reduced so that the maximum potentiated discharge is less than that produced by maximal tetanic parameters (*2*).

A further difficulty in interpreting effects on PTP is introduced if the drug increases or decreases the discharge zone at rest, inasmuch as equivalent degrees of PTP are not to be expected at different levels of excitability (*12, 14*). Figure 1*D* shows the relationship between PTP ratio and maximal discharge zone at rest (pretetanic) which holds for the data of Fig. 1*A*. The additional complication of change in discharge zone can be dealt with in several ways. Qualitative statements regarding the effect of a drug are justified if both PTP ratio and discharge zone at rest are influenced in the same direction by the drug (Fig. 1*D*).

For more quantitative evaluation of the effect of the drug it is often possible to vary excitability (for example, by changing temperature) so that the discharge zone is restored to the control level. PTP may then be compared with the control determination. In altering level of excitability to restore the initial discharge zone the assumption is implicit that the procedure employed to vary excitability (for example, temperature) does not specifically affect the potentiating process. The soundness of conclusions derived in such experiments depends on the validity of this assumption.

The foregoing considerations refer specifically to 2N pathways of the spinal cord. For the most part, however, they apply also to sympathetic ganglia; the postsynaptic neuronal pool is limited, and a similar relation exists between PTP ratio and discharge zone at rest (*3, 13*). Furthermore, Dilantin reduces PTP at this site only when testing is in the "submaximal" zone. It is probable that the considerations discussed apply in a general way to PTP in polysynaptic pathways of the spinal cord (*4*) and in all other synaptic systems in which, under the experimental conditions employed, limitations on efferent pool size exist.

It is therefore apparent that drugs studied for modification of PTP must be tested in a manner capable of revealing an effect if one exists. In addition, if the agent changes the level of excitability, a nonspecific effect on PTP and on PTP ratio is to be expected. Arguments for a specific effect of a drug on the potentiating process must take account of these relationships.

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8 October 1956

Correction

Two corrections should be made in the item "Blood groups and disease" [*Science* **124**, 674 (12 Oct. 1956)] which reports a paper on associations between blood groups and disease read to the British Association for the Advancement of Science.

The three diseases for which the evidence is overwhelming are (i) duodenal ulcer, (ii) gastric ulcer, (iii) cancer of the stomach. As is stated, the ulcers are commoner in persons of group O, and cancer of the stomach in persons of group A. There is fairly strong evidence in connection with diabetes mellitus and pernicious anemia; but the incidence is raised in group A, not groups O and B.

It should perhaps be added that practically all the data so far come from Western Europe and North America, and the associations might be different or absent in other peoples.

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Book Reviews

Atomic Quest. Arthur H. Compton. Oxford University Press, New York, 1956. xix + 370 pp. Illus. $5.

This book is a personal history of the release of the atom's energy. The author was a central figure in this great drama, and the meticulous care and wisdom with which he conducted his own scientific research is reflected fully in his writing in this book. It is without doubt the most authoritative source available on many aspects of the atomic bomb project. Men who worked from the beginning learn new facts about the early decisions and motivations behind those decisions.

Better than in most histories the real factors underlying one of mankind's most important developments are set forth in this work. The author's understanding of the essentials of scientific research and development, as well as his deep human feeling and perception, qualify him ideally to write this story. The more technical points in the essential fabric are described with clarity and brevity. One is given a feeling for the significance of fast neutron cross sections and the relation between these numbers and the critical mass of fissionable material. One learns the awful truth—that two harmless looking pieces of metal, when put together, rapidly can release enormous quantities of energy.

The story is a personal one, which is fortunate. It gives the book a Churchillian authenticity which otherwise could not exist. For those of us who know Arthur Compton, the reading of the book becomes a very pleasant personal experience. His wide acquaintance with scientists and his breadth of interests make it possible for him to move throughout most of the story in his personal manner. One has a feeling it will be a long time before the world again sees a congregation of men as capable and attuned to their opportunities and responsibilities as were the guiding scientists in the project. Most of the story can now be told, for sufficient material has been declassified. There are still gaps, however, and it may be that they will be filled before the memory of living men who can relate these experiences fades away. It is to be hoped that this will be so, in order that the great drama which Compton's book sets forth in principle and in considerable detail can finally be complete. No historian will ever dare to neglect this volume in writing the history of World War II. It is beautifully written, carefully documented, and thoroughly interesting from cover to cover.

W. F. LIBBY

U.S. Atomic Energy Commission

Kernmomente. H. Kopfermann. Akademische Verlagsgesellschaft, Frankfurt, 1956. 462 pp. Illus.

Among the increasing number of books on nuclear moments, Kopfermann's second edition of his earlier *Kernmomente* represents a particularly valuable addition. As he states in the preface, great progress has been made in this field during the 15 years since the first edition and, although it was before a special branch of optics, engaging only a small group of physicists, it is now the object of vastly ramified research in many laboratories. Kopfermann is not only one of the outstanding pioneers in the work on nuclear moments but also one of those who have contributed toward its further progress in recent years. It is, no doubt, this rare combination that has enabled him to give a comprehensive account in which the perplexing multiplicity of aspects is woven into a single unit.

Rather than being chosen according to the very different methods employed, the chapters of the book are characterized by the objects under investigation. Dealing with the simplest objects—that is, with free atoms—it is logical that most of the basic considerations appear in the first chapter. This chapter contains the discussion of those investigations which were historically the first —that is, those of optical hyperfine structures and of atomic beams. Nevertheless, it accounts also for more recent investigations on free atoms, such as those of Kastler, Brossel, and Bitter, based upon the simultaneous use of optical and high-frequency resonances. Besides the description of the experimental methods and the interpretation of the data, this chapter contains also the necessary theoretical considerations which lead to the values of nuclear spins, magnetic dipole moments, and electric quadrupole moments. Although all the necessary formulas are given, this is done without an overburdening mathematical apparatus; the derivations are, as far as possible, based on correspondence arguments, and quantum-mechanical proofs, where necessary, are merely indicated. Proper attention is also given to the isotope effect and to the conclusions which it permits.

The second chapter deals with free molecules as the next more complicated objects, introducing in particular those features which arise from their rotation and, among the newer methods for their investigation, that of microwave spectroscopy. Although free neutrons are even simpler than atoms and can hardly be labeled as molecules, the determination of their magnetic moment is likewise mentioned in this chapter.

The investigations of nuclear moments in bulk matter, notably in liquids and crystals, are treated in the third chapter. In view of the specific character of the methods, due emphasis is given to the various electronic arrangements which have been employed. Nevertheless, it is gratifying to see that the presentation of their basic features is not overshadowed by the discussion of circuits. Nuclear magnetic and quadrupole resonances are discussed as well as paramagnetic resonances insofar as they have a bearing on nuclear moments.

The last chapter contains a brief discussion of the relation between nuclear moments and the models of the nucleus.

Not only does the book give a most helpful introduction into the subject, but it should also be of great value to those working in the field, insofar as it is a guide through the vast literature, mentioned in ten pages of references.

F. BLOCH

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Automation. A report of the technical trends and their impact on management and labor. Department of Scientific and Industrial Research. H. M. Stationery Office, London, 1956 (order from British Information Service, 30 Rockefeller Plaza, New York, N.Y.). 196 pp. $1.08.

Within its self-imposed limitations, this little booklet is the best general introduction to the subject that has yet been published. Written in admirably clear and simple prose, it presents a balanced picture of our experience so far with respect to automation. The conclu-

sions: automation is neither something entirely new nor yet just another name for something old; it will create some short-lived social dislocations but on the whole more jobs and higher-level jobs; it will create the need for major changes in the education of technologists, scientists, and managers; and the speed of its introduction will largely be controlled by the availability of technologists and managers equal to its demands, are a fair, judicious and objective summary of our knowledge and experience to date and are well supported.

But the limitations which this booklet sets for itself deprive it of some of its usefulness. In the first place, it is primarily concerned with automation in manufacturing industry. Yet the impact of automation on clerical work and on distribution is, we already know, much greater than on manufacturing work. The speed with which automation is being introduced outside of manufacturing is also very much greater. And the social and economic impact of automating the flow of information and ideas —as against the handling of physical things—is also likely to be very much more marked.

But even within the application of automation to manufacturing, this publication largely restricts itself to discussing automation as the application of new techniques and new tools to the production of already existing and already designed products. But our experience shows that the very least that automation demands is the redesign of these existing products rather than the mere replacement of preautomated by automatic tools for the same design. More important even, automation will make possible, may indeed demand, the design of entirely new products. Above all, it demands, as does every basic method of work, the rethinking and redesign of the business and its organization, its objectives, its risks, and its management. It is in this area that the major challenge of automation lies. It is in this area also that the major social, economic, and educational impacts will arise.

It is understandable that a publication like the present one which is clearly written for the layman—whether manager or engineer—decided to stay away from these subjects. In the first place, they would have involved fairly difficult discussions of such highly abstract matters as mathematical information theory, operations research and synthesis, or the logic of decision-making. Second, here we deal with matters which are still in the exploratory stage, still the subject of "speculation" rather than of performance. Yet tomorrow's technologist and manager will have to understand these areas—even if he himself need not be an expert in the new theoretical and conceptual knowledge required. That the ability and the skill of technologists and managers are likely to be the "controlling factors" in the speed with which automation is being introduced, and are likely to prevent any "automation revolution" from occurring overnight, is largely because "ability and skill" of technologists and managers mean, above all, understanding and knowledge of new conceptual and theoretical knowledge.

A major feature of this booklet is an extensive bibliography—the best that I have seen so far. Particularly noteworthy is the full coverage of the Russian contribution to the field.

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New Concepts in Flowering-Plant Taxonomy. J. Heslop-Harrison. Harvard University Press, Cambridge, Mass., 1956. 135 pp. Illus. $1.25.

As W. B. Turrill explains in the foreword to this little book, it is an "account of the impact of experimental and other intensive studies on orthodox plant taxonomy." It begins with a historical account of the development of what has come to be called "classical taxonomy." Here the author concisely but critically outlines the development of orthodox taxonomy and poses the problems that are to be considered in more detail.

There is a summary of the basic and pertinent facts of genetics as they bear upon variation in the phenotype, together with a discussion of how genetic effects can be distinguished from those of the environment. The breeding system or genetic system is discussed in relation to taxonomy and the population concept; and the conclusion that the "breeding system prevailing in any group of plants is always of enormous taxonomic importance" is adequately demonstrated. Then follow examples of the study of, and the means of study of, ecological differentiation of populations, geographical variation, reproductive isolation, and cytological variation. Various types of variation patterns are characterized and related to the factors influencing or accomplishing reproductive isolation or its breakdown. Cytological variation at various levels is discussed with familiar examples.

Finally, categories that have been proposed by various workers in experimental disciplines are examined, and these are compared with those of orthodox taxonomy. Possibly here the distinctions between "experimental" and "classical" taxonomy are overemphasized. There is, of course, important and useful work which bridges the gap, and I suppose that the majority of taxonomic work in the future will continue profitably to combine techniques and concepts from both approaches. In pointing out that classical taxonomy customarily deals with the *products* of evolution, while experimental taxonomy seeks to understand the details of the *process,* Heslop-Harrison, it seems to me, has put his finger on what is the basis for the most serious conflict between the two approaches. The question of whether any "categories" in the usual sense, even those of the experimentalists, can express the process of evolution has not been satisfactorily answered.

Although the "experimental" taxonomist, and probably even the modern "classical" taxonomist, will find little that is new in this book, he will undoubtedly appreciate the concise and general treatment of material elsewhere brought together only in the necessarily much more extensive *Variation and Evolution in Plants* by G. L. Stebbins. It should be an especially valuable adjunct to the teaching of taxonomy at even the lowest level. And nonbotanists should welcome it also as a painless introduction to some of the newer concepts in flowering-plant taxonomy.

There are a glossary and an index, together with a short list of suggestions for further reading. The book was first published in 1953 by William Heinemann Ltd., London, and is now issued by the Harvard University Press under the 1956 date but printed in Great Britain apparently without change.

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Modern Views on the Secretion of Urine. The Cushny memorial lectures. F. R. Winton, Ed. Little, Brown, Boston, 1956. 292 pp. Illus. $8.50.

This book represents the compiled series of lectures given at University College, London, in the summer of 1955 to honor A. R. Cushny, who held the chair of pharmacology at that institution from 1905 until 1918. The ten lectures which go to make up this volume might be regarded, as the editor points out, "as modern views on various aspects of the secretion of urine." They were given by present and former workers at University College on the 50th anniversary of Cushny's appointment to the chair of pharmacology.

It is not until one sees papers by these outstanding persons that one realizes what a weight of study of urinary secretion has centered around University College Hospital. The lectures here presented also attest to the diversity of approaches to the subject, manifested by the several authors. These range from

excellent statements of the problems of pressures and flows in the kidney, by Winton, and the process of secretion, by Bayliss, to an interesting discussion of genetic aspects of tubular function, by H. Harris.

Bayliss' excellent paper, along with Rosenberg's discussion of active transport in the eighth symposium volume of the Society of Experimental Biology, should supply both students and investigators alike with an excellent reference statement of this complex field. Winton's lecture is also outstanding, containing critical discussions, not only of his own classical work on intrarenal pressures, but also the just published work of Gottschalk and Mylle on pressures in the proximal tubules and peritubular capillaries and their relation to ureteral and renal venous pressures. Here also one finds the new work of Kintner and Pappenheimer on renal hemodynamics critically discussed. Thus the book in many aspects is very contemporary.

The errors in this book are few, and it is almost to dwell on minutiae to point out one of them. One would hope that in a future edition Grace Eggelton would refer to B. Schmidt-Nielson, the distinguished *daughter* of August Krogh, according to her womanly due as "she" instead of "he," as she does on page 54. Along with Homer Smith's classic monographs, Robinson's *Reflections on the Kidney* and Cushny's own classic book, this book should be a useful and up-to-date addition to the working library of all those whose interests touch this fascinating field.

WILLIAM D. LOTSPEICH
College of Medicine,
University of Cincinnati

Books Reviewed in The Scientific Monthly, December

The Laws of Nature, R. E. Peierls (Scribner's). Reviewed by J. Turner.

The Men behind the Space Rockets, H. Gartmann (McKay). Reviewed by H. Yagoda.

Genetics in the Atomic Age, C. Auerbach (Essential Books). Reviewed by B. Glass.

Public Works and Employment from the Local Government Point of View, E. C. McKean and H. C. Taylor (Public Administration Service, Chicago). Reviewed by D. P. Ray.

A Field Guide to the Ferns and Their Related Families of Northeastern and Central North America with a Section on Species also Found in the British Isles and Western Europe, B. Cobb (Houghton Mifflin). Reviewed by L. J. and M. Milne.

The Condensed Chemical Dictionary, A. and E. Rose (Reinhold; Chapman and Hall).

International Encyclopedia of Unified Science, vol. 1, pts. 1 and 2, O. Neurath, R. Carnap, C. Morris, Eds. (University of Chicago Press). Reviewed by J. A. Behnke.

An Essay on the Foundations of Geometry, B. A. W. Russell (Dover).

Investigation on the Theory of the Brownian Movement, A. Einstein, R. Furth, Ed. (Dover).

Organization of the Federal Government for Scientific Activities (National Science Foundation).

Robert Hooke, M. 'Espinasse (University of California Press). Reviewed by R. P. Multhauf.

New Books

Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability. Held at the Statistical Laboratory, University of California, December, 1954, July and August, 1955. vol. I, *Contributions to the Theory of Statistics.* 208 pp. $6. vol. III, *Contributions to Astronomy and Physics.* 252 pp. $6.25. Jerzy Neyman, Ed. University of California Press, Berkeley, 1956.

Psychology, Psychiatry and the Public Interest. Maurice H. Drout, Ed. University of Minnesota Press, Minneapolis, 1956. 217 pp. $4.

Handbuch der Physik. Band XVII, *Dielectrics.* S. Flugge, Ed. Springer, Berlin, 1956. 406 pp. DM. 94.

Economic Analysis. Edmund Whittaker. Wiley, New York; Chapman & Hall, London, 1956. 460 pp. $6.50.

The Oscilloscope at Work. A. Haas and R. W. Hallows. Iliffe, London; Philosophical Library, New York, 1956. 171 pp. $10.

Physical Chemistry for Students of Pharmacy and Biology. S. C. Wallwork. Longmans, Green, New York, 1956. 307 pp. $5.

Reference Data for Radio Engineers. International Telephone and Telegraph Corp., New York, ed. 4, 1956. 1121 pp. $6.

New Era of Flight. Aeronautics simplified. Lewis Zarem and Robert H. Maltby. Dutton, New York, 1956. 176 pp. $3.75.

Composition and Properties of Concrete. George E. Troxell and Harmer E. Davis. With chapters on "Proportioning of concrete mixtures" and "Strength of concrete" by J. W. Kelly. McGraw-Hill, New York, 1956. 434 pp. $7.75.

Atomic Weapons and East-West Relations. P. M. S. Blackett. Cambridge University Press, New York, 1956. 107 pp. $2.

Men with Golden Hands. A book of surgical miracles. E. H. G. Lutz. Translated by W. H. Johnson. Appleton-Century-Crofts, New York, 1956. 269 pp. $3.75.

Personal Character and Cultural Milieu. A collection of readings. Compiled and edited by Douglas G. Haring. Syracuse University Press, Syracuse, N.Y., rev. ed. 3, 1956. 834 pp. $7.50.

Handbook of Biological Data. William S. Spector, Ed. Prepared under the direction of the Committee on the Handbook of Biological Data. Saunders, Philadelphia, 1956. 584 pp. $7.50.

Organo-Metallic Compounds. G. E. Coates. Methuen, London; Wiley, New York, 1956. 197 pp. $2.50.

Calder Hall. The story of Britain's first atomic power station. Kenneth Jay. Harcourt, Brace, New York, 1956. 88 pp. $3.

Smithsonian Institution, Annual Report of the Board of Regents. Showing the operations, expenditures, and condition of the Institution for the year ended 30 June 1955. Smithsonian Institution, Washington, 1956. 537 pp. $4.

Medical Sciences. Series VII, *Progress in Nuclear Energy.* J. C. Bugher, J. Coursaget, and J. F. Loutit, Eds. McGraw-Hill, New York; Pergamon, London, 1956. 165 pp. $6.

Physiology of the Ocular and Cerebrospinal Fluids. Hugg Davson. Little, Brown, Boston, 1956. 388 pp. $14.

Special Lectures in Biochemistry, 1954–1955. University College, London, 1956 (order from H. K. Lewis, P.O. Box 66, London, W.C.1). 106 pp. 12s. 6d.

The World of Learning, 1956. Europa Publications, London, ed. 7, 1956. 1064 pp. $18.50.

Personality, Stress and Tuberculosis. Phineas J. Sparer. International Universities Press, New York, 1956. 629 pp. $12.50.

Modern Mathematics for the Engineer. Edwin F. Beckenbach, Ed. McGraw-Hill, New York, 1956. 514 pp. $7.50.

Treatise on Inorganic Chemistry. vol. II. *Sub-Groups of the Periodic Table and General Topics.* H. Remy. Translated by J. S. Anderson. J. Kleinberg, Ed. Elsevier, Amsterdam-Princeton, 1956. 800 pp. $17.75.

Soil Fertility and Fertilizers. Samuel L. Tisdale and Werner L. Nelson. Macmillan, New York, 1956. 430 pp. $7.75.

The Chemistry of Petrochemicals. Melvin J. Astle. Reinhold, New York; Chapman & Hall, London, 1956. 267 pp. $6.50.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

An Outline for the Study of an Amphibian Life History. Tulane Studies in Zoology, vol. 4, No. 3. Fred R. Cagle. Tulane University, New Orleans, La., 1956. 32 pp. $0.40.

Selected ASTM Engineering Materials Standards for Use in College Curricula. American Society for Testing Materials, Philadelphia, 1956. 358 pp. $4; Students, $1.50.

Psychologic Aspects in the Care of Infants and Children. Report of the twenty-first Ross Pediatric Research Conference. Ross Laboratories, Columbus, Ohio, 1956. 90 pp.

Research Report, Land Locomotion Research Laboratory. No. 4. Detroit Arsenal, Center Line, Mich., 1956. 55 pp.

A Direct Determination of the Gamma Emission from a PO-BE Source. Rept. No. 56–59. Henry M. Borella, Sanford C. Sigoloff, Loren C. Logie. Air University, School of Aviation Medicine, USAF, Randolph Air Force Base, Texas, 1956. 4 pp.

Letters

Quality and Quantity

Lee DuBridge [*Science* **124**, 299 (17 Aug. 1956)] tells us many wise and useful things in "Scientists and engineers: quantity plus quality." However, one of his arguments should be questioned. He advocates that "a few [a dozen] schools of science and engineering be encouraged to devote their resources to the sole task of improving quality." For the remaining schools, he somewhat reluctantly suggests that they "should face more frankly the range of intellectual caliber to be found among their students . . . [and] admit [if not openly, at least to themselves] . . . that [they are] going to cater to the middle or lower third of college students rather than the upper third," thereby supplying the quantity of second- and third-rate engineers and scientists he apparently feels we can use.

First, how does this suggested separation of schools into a few "quality" and a large number of "quantity" schools differ from what we now have? DuBridge would apparently more or less formalize and freeze the present status. In addition he would raise salaries at the "quality" schools, presumably leaving them as they are (for he ignores the point) at the "quantity" schools. These moves would undoubtedly aggravate the present situation.

Second, a school that openly admitted to its faculty (not to "itself") that it would "cater to the middle or lower third of college students" would be violating the most fundamental principle of psychology—the principle of self-respect. The natural impulses of all psychologically healthy teachers and students would be to reverse the admission of mediocrity or leave the institution as quickly as possible.

I believe that DuBridge is placing the blame for the generally low level of science and engineering graduates at the wrong point. There are strong reasons to believe that low-quality graduates result mainly from low-quality opportunities in mediocre schools rather than that they are the result of low-quality brains, as DuBridge seems to believe.

As an alternative approach to this problem, I suggest that we pursue the "swarming" principle. Let us continue to cultivate and maintain our present "quality" hives. But instead of encouraging them to grow bigger and bigger, and loftier and loftier, let us encourage them to "swarm" and start new (or help old) colonies to grow strong in "quality" also. For example, let the California Institute of Technology assist the Oklahoma Frontiers of Science Foundation to establish an "Oklahoma Institute of Technology." I would be willing to bet that C.I.T. would soon be convinced in education that "quantity" and "quality" need not and should not be separated.

JOSEPH W. STILL
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Research and Freedom

I see no paradox in conjunction with the editorial "Research and freedom" [*Science* **124**, 427 (7 Sept. 1956)]. The argument quoted from the *Baltimore Sun* could be reduced to: "Russia is making much scientific progress; Russian scientists are considerably restricted by their government; therefore governmental restriction is not harmful to scientific progress!" The American premise is that governmental restriction *is* harmful to scientific progress—hence, the seeming paradox.

The *Sun*'s argument does not consider the transcendental nature of Russia's science. There is no doubt that the Russian scientist has been highly restricted in the past (and his work in general was of debatable merit) and he is apparently politically channeled today; but we can hardly say that he is *scientifically* inhibited these days. His government gives him much prestige and relatively better pay than his countrymen and cooperation in international scientific events (the Geneva exhibition and conference and his own nuclear "open house"). In a sense he is made to feel a leader in his community.

Another inference in the *Sun*'s argument is that Russia's rapid progress has come not only *in spite of* but possibly *because of* governmental control of the scientist, and that perhaps some more of the same might help this country; but I say Russia's progress has come largely from making her scientists feel needed and important. This intelligent governmental policy cannot be assigned to Lenin; it is a simple outgrowth of one of the basic concepts of 20th-century psychology: the greatest motivator of man is his desire to win mankind's approval. Our own government would be smart in giving its own scientists more public recognition and prestige—rather than treating them as would-be international delinquents.

If we must get ideas from Russia, let us select the better ones; by this I mean let us have less regimentation and domination of man by man and more recognition of our scientists.

WILLIAM S. JARNAGIN
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Terminology

Attention should be drawn to the fact that substitution of the word *autoradiography* for *radioautography* is incorrect. In radioautography an image is obtained which corresponds to the distribution of a radioisotope within an object. The image is the result of radiation from the contained radioisotope and does not necessarily correspond to the internal structure. On the other hand, radiography is a process in which an image of internal structure is obtained. This image results from differential absorption or deflection of external, penetrating radiation. The information derived from the two methods and, indeed, the methods themselves are not analogous. Placing *auto* before *radiography*, which indicates some form of self-operating radiography, gives no indication of what is intended when the term is used. Furthermore, the implication of an external source of radiation which *radiography* carries is misleading when *autoradiography* is used.

Tauxe *et al* [*Science* **120**, 149, (1954)] and George Boyd [*Autoradiography in Biology and Medicine* (Academic Press, New York, 1955)] support the use of *autoradiography* on etymological grounds. They also deplore the use of a word in which four consecutive vowels occur as in *radioautography*. While there must be due regard for etymology, we believe that semantic accuracy is far more important and that the meanings and connotations that roots have acquired in recent times are those by which we must be governed in the creation of scientific terms. Furthermore, we do not think that *radioautography* is any more

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difficult to say, write or read than is *autoradiography*.

Happily we do agree with these authors on the suffix to be used to denote the results of radioautography—namely, *-gram*. *Radioautogram* and the contraction, *autogram*, are perfectly good terms.

We hope that those who have occasion to deal with radioautography will give a little thought to the semantic problem and henceforth use the correct terminology.

DAVID L. JOFFES
SHIELDS WARREN
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Training of High-School Teachers

The shortage of teachers usually is attributed mainly to their low economic and social status, but improvement in this direction alone, however desirable, does not guarantee a sufficient increase in the number and quality of students entering colleges of education, because the training programs offered at present may not be attractive enough. Therefore, alternative methods of teacher recruitment should be explored.

It is not widely recognized that the whole concept of training secondary-school teachers in the United States is basically different from that of all European countries: it stresses professional training at the university, leaving little time for the study of subject matter, whereas in Europe the emphasis is on a broad education and study of subject matter. For example, prospective teachers in a German Oberschule, which corresponds closely to our high school, study at a university for 4 years, without being attached to a separate department of education. They follow curriculums like those offered by our liberal arts colleges with a wide choice of major subjects. After a comprehensive examination, the preparation of teachers is completed by 2 years of in-service training with pay and a professional examination. Other European countries have similar training programs. There can be little doubt that under such a system many teachers could be procured also in the United States, because most of the graduates of our liberal arts colleges would become eligible for a teaching career.

Because in Europe little or no educational training is given to prospective high-school teachers at the university, many of these students are attracted to the university primarily by their interest in subject matter. Whether this has a favorable or unfavorable effect on selection of teachers may remain undecided, but it should be considered that the training offered opens their careers as well and that the decision to become a teacher need not be made when one is entering the university. For example, many European scientists have emerged from this large pool of students. Conclusive evidence about the merits of the European teacher training probably could be obtained rather readily by comparing the results achieved in European and American schools.

The present crisis is so urgent that all possibilities of improving the supply of well-trained teachers should be considered. Experiments with untried methods may not be necessary, because the apparently successful European system points toward a solution of the problem.

EMIL BOZLER
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Hidden History of a Dictionary

In his kindly review of *The International Dictionary of Physics and Electronics* [*Science* **124**, 728 (19 Oct. 1956)], Bowen Dees states that it would be interesting to know who conceived the idea of this volume. Apparently he has learned, as I have, that the title page of a book does not always reveal its history. I am glad that he has given me an excuse to complete the record and to give credit where credit is due.

The idea of a modern dictionary of physics was conceived in a conference of the officers of the Van Nostrand Company, under the leadership of E. M. Crane, Sr. The success of the *Chemists' Dictionary*, published in 1953, led this group to believe that a volume dealing with physics would find use and acceptance. The problem of its production was turned over to William R. Minrath, who brought to it considerable experience in scientific and technical lexicography. It was he who searched the literature for a list of terms to be included, collected definitions approved by professional organizations, and did the basic spade work on which the final compilation was based. Only after he had completed this process were the editors chosen. We added to Minrath's list; we deleted from it; we revised definitions; we felt throughout a great debt to the man who had contributed more than any of us but who, as an officer of the publishing house, refused to have his name included among the editors.

WALTER C. MICHELS
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Australia Free from Rabies

In a report on zoonoses [*Science* **123**, 94 (20 Jan. 1956)], based on a recent article by Meyer [*Bull. Med. Research* **10**, No. 1, 2 (Sept.–Oct. 1955)] there is the statement: "No part of the world is free of rabies." In point of fact, there is a very large part of the world that is free of rabies in the Pacific area, even though much of it is water; however, one could start from the west coast of North and South America, across to a line skirting the east coastlines of Japan and the Philippines, thence down west of New Guinea to our Australian west coast, and say that within that vast area there is no rabies known to be present.

This area includes Hawaii, Fiji, Samoa, Solomon Islands, New Hebrides, New Guinea, New Zealand, and many smaller groups of islands, and Australia which in area is in itself almost as large as the United States. Have I proved my point?

At the time of writing, I have not read Meyer's article, but in many publications on zoonoses by the World Health Organization and publications by the Office International des Epizooties, mention is invariably made of the freedom of Australia and New Zealand from rabies.

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Meetings and Societies

Anthropological and Ethnological Sciences

The fifth International Congress of Anthropological and Ethnological Sciences was held in Philadelphia, 1–9 Sept. 1956, with the University of Pennsylvania as host and Froelich G. Rainey presiding.

Registered attendance comprised about 600 scientists, of whom all but 191 were from the United States. These 191 represented 53 countries, as follows: France, 17; Germany, 16; England, 14; Belgium, 10; Austria and Italy, 9 each; Japan, 8; Canada, 7; Denmark, the Netherlands, Puerto Rico, and Switzerland, 6 each; Sweden, 5; Greece, Hawaii, and Mexico, 4 each; Brazil, India, Norway, Poland, U.S.S.R., and Vietnam, 3 each; Belgian Congo, British West Africa, Cuba, French West Africa, Haiti, Indonesia, Morocco, Peru, Scotland, South Africa, and Spain, 2 each; and Algeria, Australia, Barbados, Cameroons, China, Ecuador, Hungary, Iceland, Iran, Israel, Malaya, New Caledonia, New Zealand, Pakistan, Portugal, Transvaal, Turkey, Uganda, Uruguay, and Venezuela, 1 each. Delegations that had been expected from seven other countries were unable to attend.

The scientific program consisted of 306 papers and 21 motion pictures. The papers can be roughly grouped under four headings, namely, cultural anthropology, physical anthropology, archeology, and museology. Those on cultural anthropology constituted by far the major part of the program, numbering 207 (ethnology 33, ethnography 28, acculturation 17, ethnomusicology 14, social organization 14, diffusion and ethnology 11, linguistics 11, religion 11, agricultural anthropology 10, political organization and law 10, applied anthropology 8, ethnopsychology 8, circumpolar culture complex 7, art 5, ethnolinguistics 5, folklore 5, theory of types 4, economics 3, values 3). Physical anthropology was the subject of 46 papers (physical anthropology 24, race and evolution 19, applied anthropology 2, theory of types 1), and archeology was the theme of 40 papers (New World archeology 21, prehistory 18, theory of types 1). Thirteen communications discussed various aspects of museology.

Some of these papers were presented as parts of two symposia (dealing with the west coast and Cordillera of South America and with the theory of types in anthropology, respectively) and at three general sessions (on ethnology, physical anthropology, and prehistory).

The sixth congress is scheduled to be held in Paris in 1960.

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Social Sciences and International Peaceful Cooperation

The social sciences staff of UNESCO called a meeting of social scientists in Geneva, 9–16 July 1956, to consider international and interdisciplinary research which might further the understanding and the practice of peaceful cooperation among nations. In addition to staff and observers, 15 other participants were distributed by country and discipline as follows: three jurists, one each from the U.S.S.R., Czechoslovakia, and France; five economists, one each from the U.S.S.R., Poland, the United States, the United Kingdom, and Sweden; five political scientists, one each from the U.S.S.R., Poland, Hungary, the United States, and the United Kingdom; two sociologists, one each from the United States and Switzerland.

There were presented for consideration working papers with proposals for research prepared by the international associations of jurists, economists, political scientists, and psychologists, as well as a detailed set of proposals prepared by the UNESCO staff itself, and proposals from a Soviet group and from various individuals. Proposals of social psychological, anthropological, and sociological turn were included in the paper on psychology and in the one prepared by the UNESCO staff.

In the course of the deliberations, the proposals were reduced to two, one of which had originally been proposed by economists and the other by political scientists. They are as follows:

1) The theory and historical evolution of concepts of peaceful coexistence-cooperation. (i) Historical development of concepts of peaceful coexistence-cooperation. (ii) Concepts of peaceful coexistence-cooperation in contemporary history, philosophy, political science, economics, sociology, and law. (iii) Comparative studies of the recent formulation of principles of public international law bearing on peaceful coexistence-cooperation. (iv) The concept of sovereignty as it relates to peaceful coexistence-cooperation, including its juridical, political, economic, and sociological aspects. (v) The influence of concepts of peaceful coexistence-cooperation on contemporary international relations.

2) Relations between countries with different economic and social systems. (i) Trade in which buyer or seller in one country is the government itself and in which the buyer or seller in the other country is a private person or company; problems of responsibilty, credit, law, and so forth, in such a case. (ii) Obstacles to trade. (iii) Effect of closer trade on social and political relations. (iv) History of East-West trade since 1920. (v) Tourism, exchange of technical knowledge, cultural exchange, and the like.

The group recommended to UNESCO that topic 2 be the subject of a special interdisciplinary conference in 1958 but that topic 1 be given equal support and attention and that UNESCO attempt to arrange a meeting to consider it also in 1958. It was recommended that these meetings consider research done by individuals or groups in various countries or groups of countries, and that any reports published should not try to coordinate and bring into one statement the various studies but, rather, should present the separate studies with appropriate introductions to show their relations to one another. The various international associations are to consider how best to implement research on the topics proposed and to communicate their recommendations to UNESCO, which will presumably decide what to finance with its limited resources. The general notion underlying the projects is that the so-called "peoples' democracies" (the Communist countries) are going concerns, as are the countries of the West. It is the contact of these going concerns that is the central problem to be studied.

Certain suggested subtopics were dropped in the course of the discussions. The Soviet group had proposed study of the effects of disarmament on economy and on standards of living. When it was pointed out that this topic could be studied only if full information on armament as part of the economy

were available, they let it drop. Proposals to compare real wages, production, and standards of living were dropped as not directly relevant to contact, although not all agreed to this assumption. Study of relations between countries of advanced industrialization and those less advanced was admitted to be important but was not pushed as part of the program.

In general, it was clear that the Eastern social scientists were much more interested in concepts and doctrines, while those of the West were more empirically minded on most matters. Those of the East were, from the beginning, quite opposed to sociological and social psychological studies, but topics of this nature were accepted in a general way in the final proposals. It was obvious that opinions and attitudes of the population are not considered by the East as open to full study and exchange of information; in private it was admitted that there are some conflicts of opinion on important matters.

Although seating was not arranged, the Eastern group, except for the Hungarian —who was a cipher in the discussion anyway—sat on one side of the U-shaped table: the three Russians in the center with their own interpreter, flanked on the right by the two Poles and on the left by the silent Czech. The Western people sat on the other side, with no obvious ordering, except that the British, Swedish, and American economists sat side by side. The staff and chair had the head of the table.

The discussions went on in English, French, and Russian with simultaneous translation. Only one of the Russians could speak French; another spoke good German; the third spoke only Russian. The Poles spoke all three languages and acted as liaison, both in language and otherwise; they obviously knew England and America well, as the Russians did not. There was fairly free corridor contact, with the Russians joining freely even in private conversations. There was apparently little mixing of East and West at meals, bars, and in the evening. The informal groupings were about what one would expect in a group so constituted in language, nationality, and academic discipline. The Russians spoke with the voice of a delegation with a leader and a mandate; the people of the West talked and acted as individuals, such consensus as they showed being quite spontaneous. The temper of the meeting was amicable and became more so as the days went on. The proof of the pudding will come in a year or so when the time comes to present concrete findings and to compare those of West and East.

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AAAS 50-Year Members

At a recent meeting, the AAAS board of directors voted to elect the following persons, all of whom have been dues-paying members of the association for 50 years, to the status of 50-year members: Edwin P. Adams, Ernest Adna Back, James T. Barrett, Samuel G. Barton, Guy G. Becknell, Lee F. Bennett, John Lewis Bremer, George H. Bretnall, Howard L. Bronson, William E. Brooke, A. Morris Buck, Charles H. Bunting, Ira D. Cardiff, Wesley Roswell Coe, Rufus I. Cole, Henry S. Conard, William S. Cooper, John J. Davis, Charles E. Decker, Oris P. Dellinger, Frances R. Dewing, Louis I. Dublin, Paul Moore Dysart, Edward C. Elliott, Frederick C. Ferry, Martin H. Fischer, George Shannon Forbes, and Gordon Scott Fulcher.

H. R. Fulton, William C. Geer, John Hiram Gerould, N. J. Giddings, W. Nelson Goodwin, Jr., Addison Gulick, George Daniel Shafer, Philip A. Shaffer, Victor E. Shelford, A. Franklin Shull, Frank M. Simpson, Roy Harman Smith, Howard Dexter Smith, John Reed Swanton, Robey W. Harned, George Thomas Hargitt, Frederick Z. Hartzell, Philip Bovier Hawk, T. H. Hildebrandt, David Wilbur Horn, Leonard R. Ingersoll, Paul R. Jones, Walter P. Kelley, John Matthias Kuehne, Arthur O. Lovejoy, Hermann C. Lythgoe, J. F. McClendon, E. V. McCollum, Arthur William Meyer, Merritt F. Miller, Shirley Putnam Miller, Burt L. Newkirk, Arthur O. Norton, John Foote Norton, Robert Morris Ogden, George F. Parmenter, G. Patterson, Jr., Charles L. W. Pettee, Alfred Lawrence Pierce, and W. Dwight Pierce.

George G. Ramsey, Frank Walter Reed, Oscar Riddle, John M. Roberts, William S. Sadler, Hermann I. Schlesinger, Oswald Schreiner, Frederick H. Seares, Robert R. Tatnall, T. Thorvaldson, Arthur C. Trowbridge, Albin H. Warth, John Morris Weiss, John White, and Hobart Hurd Willard.

Meeting Notes

■ The first meeting of the new Section of Experimental Psychology and Animal Behavior of the International Union of Biological Sciences was held at Strasbourg on 4 Oct. 1956, under the presidency of Henri Piéron. Frank A. Geldard, Clarence H. Graham, and Herbert

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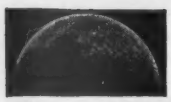

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a pair of replacements for the orchard grass around the old apple tree . . . outdoing ourselves on film speed . . . when your movies don't fit the screen

Chicken economics

When the ratio of pounds of feed to pounds of marketable chicken is carried to two decimal places (as the ag schools do in teaching that new folkway, cost accounting), little room is left in the feed bag for certain protective substances that the chickens' free-running ancestors used to get from the orchard grass around the old apple tree. Such things the chemical industry now provides. Poets of pastoral bent may rankle, but certainly not the people who make the machines that cut the gears that go into the automatic transmissions that drive the station wagons that successful farmers now buy. And chicken sandwiches taste better than ever.

As part of the chemical industry, we not only make real vitamin E for feed manufacturers in a form more than 200 times as concentrated as found in dried orchard grass, but now we have launched *Tenox BHT, Agricultural Grade*, to preserve and extend whatever vitamin A and vitamin E are already present in natural feed materials. This butylated hydroxytoluene has emerged victorious as a chemical anti-oxidant of unassailable safety even in human food. Now it is for the feedmen, the poultry growers, and their academic advisors to decide merely how much protection from what business risks is worth how much cash outlay.

Myvamix Vitamin E Feed Supplement, *commercial data about it, and a spate of scientific literature are obtainable from Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).* Tenox BHT, Agricultural Grade, *in the form of free-flowing, non-dusting granules of a particle size to assure rapid, permanent blending is now on sale by Eastman Chemical Products, Inc., Kingsport, Tenn. (Subsidiary of Eastman Kodak Company).*

S. O. 1177

We have outdone ourselves. We have made a sheet film that is approximately four times as fast as *Kodak Royal Pan Film* when both films are forced equally in the developer. Photography has scarcely had time in two years to adjust itself to the broader potentialities opened to it by *Royal Pan* and its roll film counterpart, *Kodak Tri-X Film.* These films had confounded 20 years of common photographic knowledge about the limits of fast film with respect to exposure time, lighting requirements, and the lens aperture requirements that determine depth of field. Now new and stronger superlatives must be found. Four times as fast as *Royal Pan!*

The new film does not have an official name yet. It is temporarily designated *Kodak Sheet Film S.O. 1177*, the "S.O." standing for the special order which your dealer places for two- to three-week delivery. Limited quantities only are being manufactured so that improvements and modifications, if any, can be effected quickly. News photographers who have tried this film out for us have reported back exposure index figures that some of our people regard as impossibly high by an order of magnitude. So we guess until there is an official determination we had better not mention a figure.

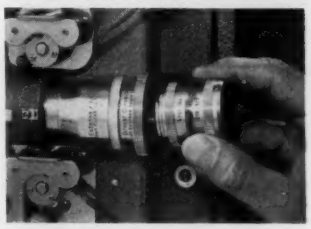
The exposure index is the parameter representing the film in the function that connects light level to the shutter and diaphragm setting on the camera. Well-meaning zealots have taken to quoting index figures as a measure of triumph over luminous insufficiency, forgetting that the index was devised as a guide to an arbitrary ideal, not a record of what you have gotten away with under certain conditions.

Still, what do you think of this shot made on *S.O. 1177* at 1/25 second, *f*/5.6 by the light of nothing more than the ordinary cigarette lighter with which wives light their husbands' cigarettes?

Want your focal length changed?

You are to show movies. You bring the projector in and set it up in the logical place. Screen's all set. You thread the film. The projector lamp goes on. As you bring the lens to focus, you are confronted with one of the following three situations: 1) the rectangle of light neatly fits the screen, and the screen is big enough for all to see comfortably; 2) the picture is too small, and the room isn't long enough to get it any bigger; 3) the picture is too big for the screen, and it is inconvenient to move the projector any closer.

All this was before the era of the *Cine-Kodak Bifocal Converter*, which



commenced several months ago. This small cylinder is a telescope of 1.25× power. It slips over the *Kodak Projection Ektanon Lens, 2-inch f*/1.6, that is standard on all 16mm projectors we make. Put on one way, it can expand the projected picture from about 6½ square feet to 10½ square feet for a 16-foot throw. Turned the other way for a large room, it can keep the picture within an 8-foot width when the projector is 10 feet farther from the screen than without the converter.

The proposition is appealing in its simplicity. For $26.50, a dollar less than the price of a single Ektanon lens, your Kodak dealer is in effect selling you two supplementary focal lengths. And the optical performance is good at all three focal lengths, because the designers of the converter knew exactly what projection lens it was to go on.

Price quoted is subject to change without notice.

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S. Langfeld attended from the United States. The next meeting of the section will be held at Brussels, 26–27 July 1957, immediately preceding the sessions of the 14th International Congress of Psychology.

■ Scientists and others with experience in fields associated with the various aspects of aging will meet at the fourth International Gerontological Congress in Merano, Italy, on 14 July 1957. Laymen are also invited to attend this meeting.

All abstracts must be submitted to the North American Committee of Cooperation for review before acceptance. The chairman of this committee is E. V. Cowdry, Washington University School of Medicine, 660 South Kingshighway, St. Louis, Mo. This procedure for handling abstracts has been suggested by Enrico Greppi, president of the congress, in order to have an excellent selection of presentations at each session.

Convoys Travel Agency (1133 Broadway, New York 10, N.Y.), which acted as the official travel agent for the third International Gerontological Congress in London in 1954, has been appointed the official travel agent for this congress and will also handle the registration. Convoys holds several blocks of travel accommodations, and diversified tours are being arranged for those wishing to go to the meeting with a group of their coworkers. Owing to extremely heavy travel during the summer months, early request for travel reservations is suggested.

■ The International Union of Crystallography has accepted the invitation of the National Research Council of Canada to hold its fourth general assembly and international congress in Montreal, Canada, from 10–17 July 1957; it will be followed by two symposia on 18 and 19 July. At the congress papers will be presented on all aspects of crystallographic research; the subjects of the symposia will be "Physical techniques of crystallographic interest" and "Electron diffraction."

The Canadian National Committee on Crystallography is acting as the local committee of the congress and has prepared a brochure giving details of the technical program and describing accommodations. Copies of this have been forwarded to the secretaries of the national committees of the member countries of the union. In this country, copies may be obtained from the chairman of the program committee, Dr. W. N. Lipscomb, School of Chemistry, University of Minnesota, Minneapolis, Minn., or from the secretary of the U.S.A. National Committee on Crystallography, G. A. Jeffrey, Chemistry Department, University of Pittsburgh, Pittsburgh 13, Pa.

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Forthcoming Events

December

26–31. American Assoc. for the Advancement of Science, annual, New York, N.Y. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., NW, Washington 5.)

The following 56 meetings are being held in conjunction with the AAAS annual meeting.

AAAS Academy Conference (L. Taylor, West Virginia Univ., Morgantown). 29–30 Dec.

AAAS Cooperative Committee on the Teaching of Science and Mathematics (M. Meister, Bronx High School of Science, New York 68). 27 Dec.

AAAS-Gordon Research Conferences (W. G. Parks, Univ. of Rhode Island, Kingston). 27 Dec.

Alpha Chi Sigma (H. G. Seavey, 30 Church St., Room 340, New York 7). 28 Dec.

Alpha Epsilon Delta (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.). 29 Dec.

American Assoc. of Clinical Chemists (A. E. Sobel, Jewish Hospital of Brooklyn, Brooklyn 16, N.Y.).

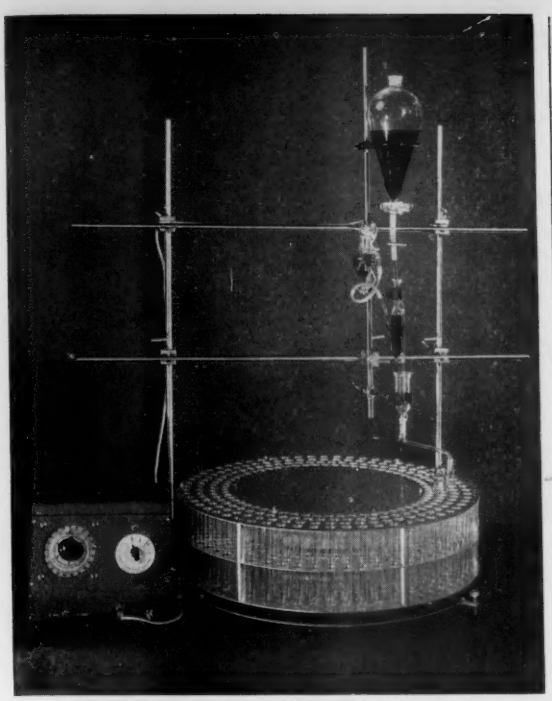
American Assoc. of Hospital Consultants (E. D. Barnett, School of Public Health, Columbia Univ., New York 32.)

American Assoc. of Scientific Workers (R. J. Rutman, 6331 Ross St., Philadelphia 44, Pa.). 29 Dec.

American Astronomical Soc. (J. A. Hynek, Harvard College Observatory, Cambridge 38, Mass.). 26–29 Dec.

American Documentation Inst. (J. Hilsenrath, National Bureau of Standards, Washington 25). 27–29 Dec.

American Educational Research Assoc. (A. G. Wesman, Psychological Corp., 522 Fifth Ave., New York 36). 29 Dec.



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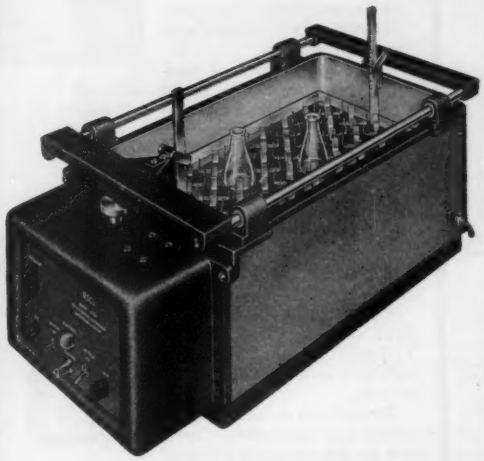

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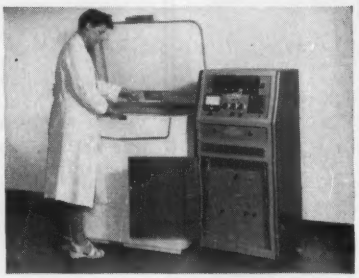

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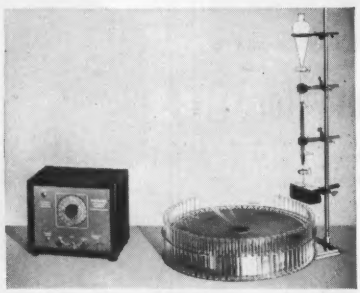

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American Meteorological Soc. (R. J. Roth, Crop-Hail Insurance Actuarial Assoc., 209 W. Jackson Blvd., Chicago, Ill.). 28 Dec.

American Museum of Natural History (G. Reekie, AMNH, Central Park West at 79 St., New York, N.Y.). 26 Dec.

American Nature Study Soc. (R. L. Weaver, Univ. of Michigan, Ann Arbor). 26–30 Dec.

American Philosophical Assoc., Eastern Div. (J. Wild, Harvard Univ., Cambridge 38, Mass.). 27 Dec.

American Psychiatric Assoc. (B. Pasamanick, Ohio State Univ., Columbus 10). 28–29 Dec.

American Soc. of Hospital Pharmacists (G. E. Archambault, U.S. Public Health Service, Washington 25). 29 Dec.

American Soc. of Range Management (F. G. Renner, Soil Conservation Service, U.S. Dept. of Agriculture, Washington 25). 28 Dec.

American Statistical Assoc. (R. E. Johnson, Western Electric Co., New York 7).

Association for Computing Machinery (J. P. Nash, Univ. of Illinois, Urbana).

Association of American Geographers (P. M. Stern, Conservation Foundation, 30 E. 40 St., New York, N.Y.).

Astronomical League (H. B. Davidson, 812 Park Ave., New York 21.)

Conference on Scientific Editorial Problems (J. G. Adashko, Ford Instrument Co., Long Island City, N.Y.). 26–28 Dec.

Conference on Scientific Manpower (T. J. Mills, National Science Foundation, Washington 25). 26 Dec.

Ecological Soc. of America (M. F. Buell, Rutgers Univ., New Brunswick, N.J.). 26–30 Dec.

Entomological Soc. of America (P. W. Oman, Plant Industry Sta., Beltsville, Md.). 27–30 Dec.

Genetics Soc. of America (A. W. Pollister, Columbia Univ., New York 27). 28 Dec.

History of Science Soc. (Miss P. Kibre, Hunter College, New York, N.Y.). 27–29 Dec.

Honor Soc. of Phi Kappa Phi (L. R. Guild, 634 So. Western Ave., Los Angeles 5, Calif.). 28–29 Dec.

Institute of Mathematical Statistics (Miss E. Scott, Univ. of California, Berkeley 4).

International Council for Exceptional Children (M. H. Fouracre, Columbia Univ., New York 27). 26 Dec.

International Union for the Study of Social Insects, North American Section (T. C. Schneirla, American Museum of Natural History, Central Park West at 79 St., New York, N.Y.). 26–27 Dec.

Mountain Lake Biological Sta. (B. D. Reynolds, Univ. of Virginia, Charlottesville).

Mycological Soc. of America (L. S. Olive, Columbia Univ., New York 27). 26 Dec.

National Acad. of Economics and Political Science (D. P. Ray, George Washington Univ., Washington, D.C.). 27 Dec.

National Assoc. for Gifted Children (Miss A. F. Isaacs, 409 Clinton Springs Ave., Cincinnati, Ohio).

National Assoc. for Research in Science Teaching (N. Washton, Queens College, Flushing 67, L.I., N.Y.). 27 Dec.

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ENTOMOLOGY, Vol. 1 (Feb. 1956)
Editors: *E. A. Steinhaus and R. F. Smith*

PLANT PHYSIOLOGY, Vol. 7 (June 1956)
Editors: *L. R. Blinks, L. Machlis, and J. G. Torrey*

BIOCHEMISTRY, Vol. 25 (July 1956)
Editors: *J. M. Luck, F. W. Allen, and G. Mackinney*

NUCLEAR SCIENCE, Vol. 6 (Dec. 1956)
Editors: *J. G. Beckerley, M. D. Kamen, and L. I. Schiff*

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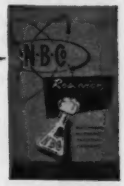

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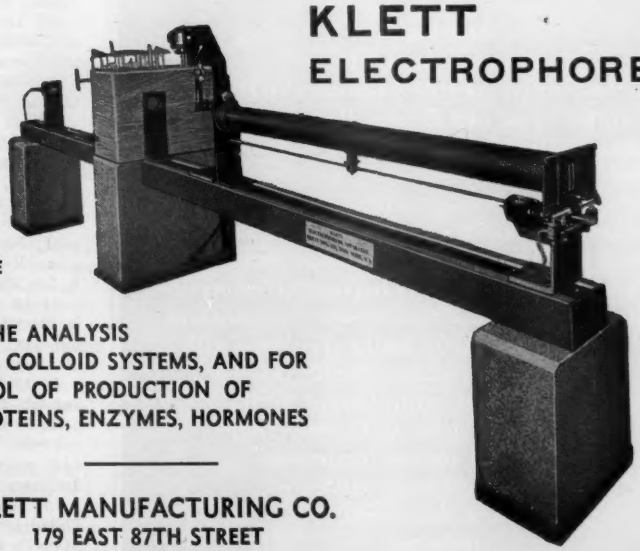

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National Assoc. of Biology Teachers (J. Breukelman, State Teachers College, Emporia, Kan.). 26–30 Dec.

National Assoc. of Science Writers (J. E. Pfeiffer, New Hope, Pa.).

National Geographic Soc. (W. R. Gray, NGS, 16 and M Sts., NW, Washington 6). 29 Dec.

National Speleological Soc. (Brother G. Nicholas, LaSalle High School, Cumberland, Md.). 29 Dec.

New York Acad. of Sciences (R. F. Nigrelli, New York Zoological Soc. and M. Kopac, New York Univ., Washington Sq., New York, N.Y.). 29 Dec.

Philosophy of Science Assoc. (C. W. Churchman, Case Inst. of Technology, Cleveland, Ohio). 29–30 Dec.

Pi Gamma Mu (B. H. Williams, Industrial College of the Armed Forces, Washington 25). 26 Dec.

Scientific Research Soc. of America (D. B. Prentice, Yale Univ., New Haven, Conn.). 26–27 Dec.

Sigma Delta Epsilon (C. Chandler, Boyce Thompson Inst. for Plant Research, 1086 N. Broadway, Yonkers 3, N.Y.).

Sigma Pi Sigma (M. W. White, Pennsylvania State Univ., University Park).

Society for the Advancement of Criminology (D. E. J. MacNamara, New York Inst. of Criminology, 2109 Broadway, New York, N.Y.). 29 Dec.

Society for the Advancement of General Systems Theory (L. von Bertalanffy, Mt. Sinai Hospital, Los Angeles 48, Calif.). 29–30 Dec.

Society for the Study of Evolution (H. Lewis, Univ. of California, Los Angeles 24). 27–29 Dec.

Society of General Physiologists (A. Shanes, National Institutes of Health, Bethesda, Md.).

Society of Systematic Zoology (R. E. Blackwelder, Box 500, Victor, N.Y.). 27–30 Dec.

Society of the Sigma Xi (T. T. Holme, Yale Univ., New Haven, Conn.). 27 Dec.

Society of Vertebrate Paleontology, annual (J. T. Gregory, Peabody Museum of Natural History, Yale Univ., New Haven, Conn.). 28–30 Dec.

Torrey Botanical Club (David Keck, New York Botanical Garden, Bronx Park, New York 58). 26–27 Dec.

United Chapters of Phi Beta Kappa (C. Billman, PBK, 1811 Q St., NW, Washington 6). 27 Dec.

27–28. Fluid Mechanics in Chemical Engineering, American Chemical Soc., Lafayette, Ind. (W. E. Ranz, Dept. of Engineering Research, Pennsylvania State Univ., University Park.)

27–28. Linguistic Soc. of America, Philadelphia, Pa. (A. A. Hill, Box 7790, University Sta., Austin 12, Tex.)

27–29. American Mathematical Soc., 63rd annual, Rochester, N.Y. (J. H. Curtiss, AMS, 80 Waterman St., Providence 6, R.I.)

27–29. American Physical Soc., Monterey, Calif. (W. A. Nierenberg, Univ. of California, Berkeley 4.)

27–29. Western Soc. of Naturalists, annual, Goleta, Calif. (D. Davenport, Santa Barbara College, Goleta.)

27–30. American Economic Assoc., annual, Cleveland, Ohio. (J. W. Bell, 629 Noyes St., Evanston, Ill.)

27–30. American Finance Assoc., annual, Cleveland, Ohio. (G. E. Hassett, Jr., New York Univ., 90 Trinity Place, New York 6.)

28. Society for the Advancement of Criminology, annual western, Fresno, Calif. (W. Dienstein, Fresno State College, Fresno.)

28–29. American Folk-Lore Soc., annual, Santa Monica, Calif. (MacE. Leach, Bennett Hall, Univ. of Pennsylvania, Philadelphia 4.)

28–30. American Anthropological Assoc., annual, Santa Monica, Calif. (W. S. Godfrey, Jr., Logan Museum, Beloit College, Beloit, Wis.)

28–30. American Historical Assoc., annual, St. Louis, Mo. (AHA, Study Room 274, Library of Congress, Washington 25.)

28–30. Archaeological Inst. of America, annual, Philadelphia, Pa. (C. Boulter, Library, Univ. of Cincinnati, Cincinnati 21, Ohio.)

28–30. Industrial Relations Research Assoc., Cleveland, Ohio. (E. Young, Sterling Hall, Univ. of Wisconsin, Madison 6.)

29. Mathematical Assoc. of America, 40th annual, Rochester, N.Y. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

29–30. American Chemical Soc., Div. of Industrial and Engineering Chemistry, Princeton, N.J. (A. H. Emery, ACS, 1155 16 St., NW, Washington 6, D.C.)

January

7–11. International Social Science Council, 3rd gen'l. assembly, Paris, France. (Secretary Gen'l., ISSC, 19, avenue Kleber, Paris 16.)

10. Technical and Clinical Applications of Radioisotopes, Assoc. of Vitamin Chemists, Chicago, Ill. (M. Freed, Dawe's Laboratories, Inc., 4800 S. Richmond St., Chicago 32.)

10–12. American Group Psychotherapy Assoc., 14th annual, New York, N.Y. (C. Beukenkamp, Jr., AGPA, Room 300, 345 E. 46 St., New York 17.)

14–16. Cottonseed Processing as Related to the Nutritive Value of the Meal, 4th conf., New Orleans, La. (Southern Regional Research Lab., USDA, 1100 Robert E. Lee Blvd., New Orleans 19.)

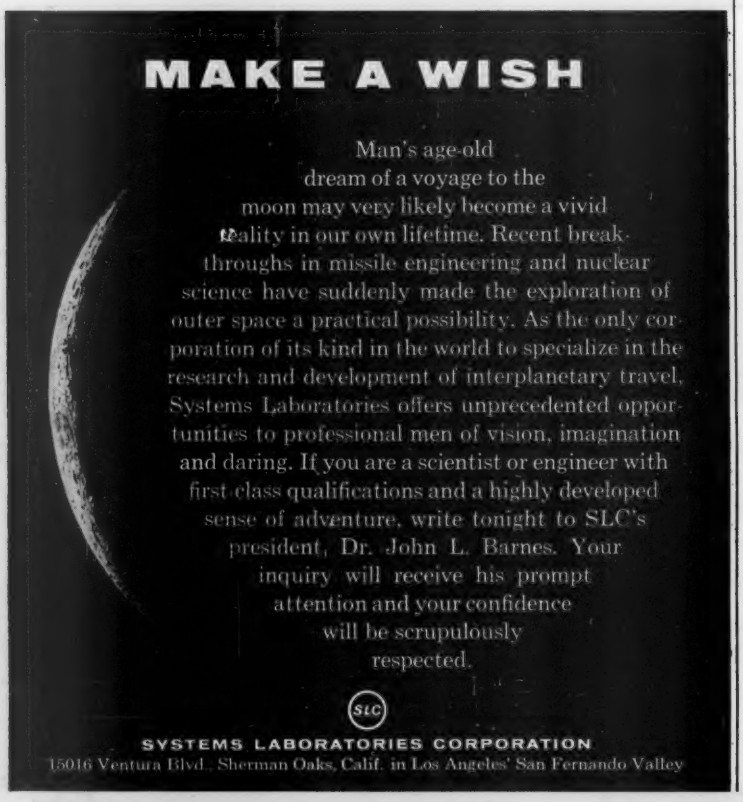
14–16. Reliability and Quality Control in Electronics, 3rd natl. symp., Washington, D.C. (C. M. Ryerson, Radio Corp. of America, Bldg. 10–6, Camden 2, N.J.)

14–18. Society of Automotive Engineers, annual, Detroit, Mich. (Meetings Div., SAE, 29 W. 39 St., New York 18.)

14–20. Indian Science Cong. Assoc., 44th meeting, Calcutta, India. (General Secretary, ISCA, 1 Park St., Calcutta 16.)

15. Society for Applied Spectroscopy, Philadelphia, Pa. (F. M. Biffen, Johns-Manville Research Center, Manville, N.J.)

16–23. Australian and New Zealand Assoc. for the Advancement of Science, 32nd meeting, Dunedin, N.Z. (J. R. A. McMillan, ANZAAS, Science House, 157 Gloucester St., Sydney, N.S.W., Australia.)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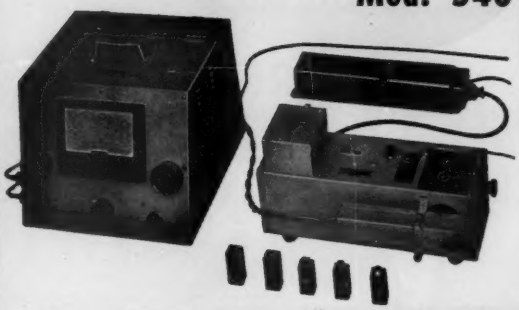

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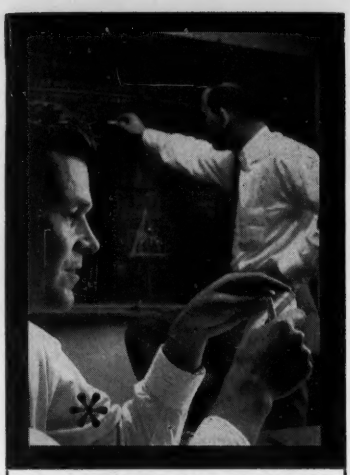

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17. Constructive Medicine in Aging: Cardiovascular Disorders in the Aged, symp., Cincinnati, Ohio. (J. B. Chewning, Wm. S. Merrell Co., Cincinnati 15.)

17–18. Engineers Joint Council, New York, N.Y. (EJC, 29 W. 39 St., New York 18.)

18–19. Symposium on Blood, 6th annual, Detroit, Mich. (W. H. Seegers, Wayne State Univ. Coll. of Medicine, Detroit 7.)

21–22. Solar Furnace Design and Operation, Phoenix, Ariz. (J. I. Yellott, Assoc. for Applied Solar Energy, 3424 N. Central Ave., Phoenix.)

21–25. American Inst. of Electrical Engineers, winter general, New York, N.Y. (N. S. Hibshman, AIEE, 39 W. 39 St., New York 18.)

23–25. Very Low Frequency Electromagnetic Waves, symp., Boulder, Colo. (J. R. Wait, National Bureau of Standards, Boulder.)

24–25. Western Spectroscopy Assoc., 4th annual, Los Angeles, Calif. (S. S. Ballard, Scripps Inst. of Oceanography, San Diego 52, Calif.)

25–26. Protein Metabolism, 13th annual conf., New Brunswick, N.J. (W. H. Cole, Rutgers Univ., New Brunswick, N.J.)

28–29. Many Body Problem, symp., Hoboken, N.J. (G. J. Yevick, Dept. of Physics, Stevens Inst. of Technology, Hoboken.)

28–31. American Meteorological Soc., New York, N.Y. (K. C. Spengler, AMS, 3 Joy St., Boston 8, Mass.)

28–31. Modern Methods of Analytical Chemistry, 10th annual symp., Baton Rouge, La. (P. W. West, Louisiana State University, Baton Rouge.)

30–1. American Assoc. of Physics Teachers, New York, N.Y. (F. Verbrugge, Carleton College, Northfield, Minn.)

30–2. American Physical Soc., annual, New York, N.Y. (K. K. Darrow, APS, Columbia Univ., New York 27.)

30–31. College-Industry Conf., 9th annual, American Soc. for Engineering Education, Los Angeles, Calif. (Univ. of California Extension, Engineering, Los Angeles 24.)

31–2. Western Soc. for Clinical Research, 10th annual, Carmel-by-the-Sea, Calif. (A. J. Seaman, WSCR, Univ. of Oregon Medical School, Portland 1.)

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4–8. American Soc. for Testing Materials, Philadelphia, Pa. (R. J. Painter, ASTM, 1916 Race St., Philadelphia 3.)

10–12. Canadian Ceramic Soc., 55th annual, Niagara Falls, Ont., Canada. (L. C. Keith, 49 Turner Road, Toronto, Ont.)

14. Present Status of Heart Sound Production and Recording, symp., Buffalo, N.Y. (R. M. Kohn, Univ. of Buffalo, 2183 Main Street, Buffalo 14, N.Y.)

14. Significance of Nucleic Acid Derivatives in Nutrition, Assoc. of Vitamin Chemists, Chicago, Ill. (M. Freed, Dawe's Laboratories, Inc., 4800 S. Richmond St., Chicago 32.)

(See issue of 16 November for comprehensive list)

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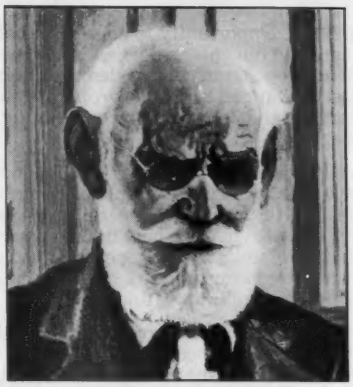

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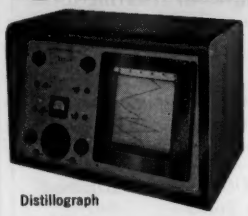

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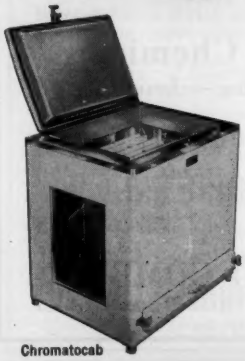

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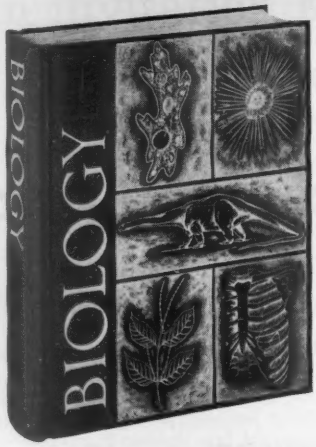

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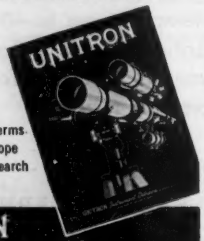

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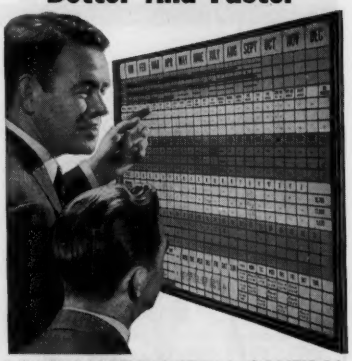

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(1) Ind. & Eng. Chem. 25-653 (June, 1933)
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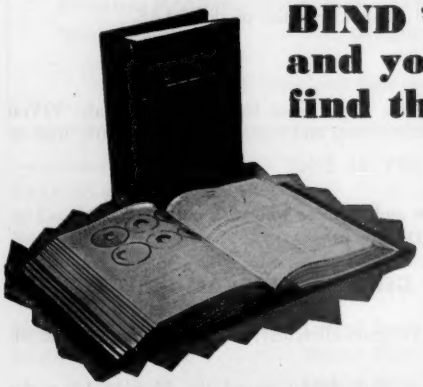

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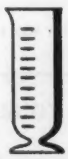

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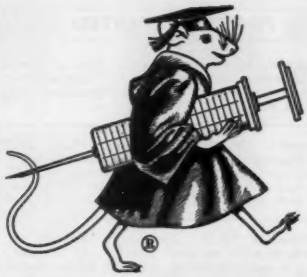

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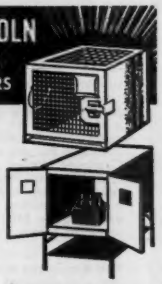

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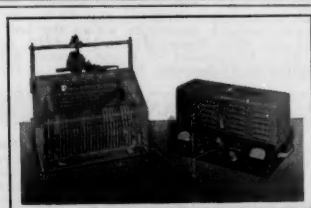

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BOX 259, SCIENCE

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Professor of Chemical Engineering. Teaching and research. Salary and rank dependent on qualifications. Apply to Head, Department of Chemistry, University of Saskatchewan, Saskatoon, Sask., Canada. X

Research Chemist to perform and supervise research work in new air sanitation laboratory. Requires either 1 year of research experience within the last 5 years in applied physical, inorganic, or analytical chemistry plus Ph.D.; or 3 years of research experience within the last 5 years plus M.S. degree. Salary $548–$710. Apply State Department of Public Health, 2151 Berkeley Way, Berkeley, California. 12/7

GRANTS

A Stoner-Mudge Foundation Postdoctoral Fellowship, M.D. or Ph.D., in medicine, biology, biochemistry, chemistry, physics, or biophysics is available for fundamental research in photoreception as related to problems of photosynthesis, vision, and nerve phenomena. The fellowship stipend for the year is $5000. Interested and qualified persons communicate with Dr. J. J. Wolken, Biophysics Research Laboratory, Eye and Ear Hospital, 230 Lothrop Street, Pittsburgh 13, Pa., **prior to 28 January 1957. Include vitae and references.** X

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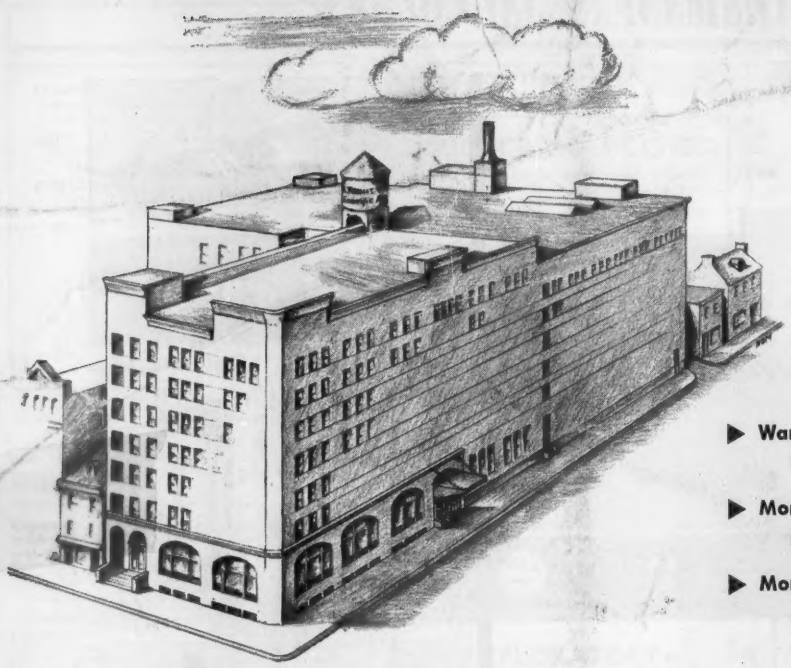

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